POPULATION PRESSURE, MIGRATION AND MARKETS:
IMPLICATIONS FOR UPLAND DEVELOPMENT

by

Ma. Concepcion Cruz

ERRATA

PAGE 17, LINE 3: The number in parenthesis should read 10,725,064.

PAGE 17, LINE 9: The number in parenthesis should read 2,797,983.

PAGE 24, LINE 3 should read: ... the nation's population increased
at a slower rate than the BFD upland communities ...

PAGE 24, LINE 9 should read: and natural growth rates were
generally higher than the national average.

TABLE 2, ITEM 4: Perez's estimate should be 71.0 not 7.10.

POPULATION PRESSURE, MIGRATION AND MARKETS:
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I. INTRODUCTION

The responses of upland communities to problems
posed by population pressure are viewed generally by
relating changes in forest resource productivity with
associated socio-cultural conservation practices. The
major concern has been the analysis of conditions under
which population pressure appears and is sustained, and
the corresponding shifts to intensive production sys-
tems leading to shortened fallow periods and resource
degradation. Dumond (1961) suggests a direct link
between demographic growth and technical change: "prac-
tices of extensive agriculture are normally adhered to
until population pressure becomes such that the system
ceases to be viable through lack of sufficient land for
rotation."[1] In this case, land scarcity implies

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that productivity per unit of land must increase even if this leads to more costly techniques and higher labor inputs.

For example, Boserup (1965) argues that in the short term, diminishing returns to labor will occur simultaneously with population pressure, so that a greater number of man-hours will be needed in order to maintain existing nutritional levels (see also Townsend, 1980). In the long run, the increase in population will force progressive changes in techniques of production, resulting in more frequent cropping. However, while population pressure is usually considered a necessary condition for technical change to occur, Levi (1976) proposes otherwise since "changes in external markets, whether domestic or international, for agricultural production may stimulate change."[2]

Changes in production, whether as an effect of population pressure or cash cropping for external markets, tend to be gradual. As Clarke (1976) points out:

> ... a man remembers that crop yields were better and that taller trees covered more hills in his childhood, but year by year the change is not so noticeable. So he shortens the fallow period gradually, bending to the demand for more food and cash production.

Initially output for a given territory
does rise before the fall effects of soil
deterioration takes hold.[3]

Outline and Scope of the Paper

This paper examines the extent of population
pressure in Philippine upland communities with respect
to conditions affecting population growth including the
broader elements of demographic stress: relevant
stages, actual numbers and distribution, direction of
movement and regional variabilities. The initial
approach presented in Part II follows Boserup's (1965)
thesis that differences in population pressure underlie
the regional variation in agricultural practices in the
uplands. We attempt to review this in terms of Philip-
pine (and Asian) upland agriculture.

In Part III we present evidence of population
pressure in the Philippines, using the National Census
and Statistics Office (NCSO) Census for 1960 and
1970. We focus on the actual extent of population
movements in the uplands with respect to migration
volume and distance, and age-sex composition of
migrants. These estimates are done for the communities
covered by the Bureau of Forest Development (BFD) 1983
listing of integrated social forestry areas.

Part IV examines the data generated and discusses

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an alternative measure of population stress by intro-
ducing the role of markets in influencing current con-
sumption levels and living standards. Finally, Part V
discusses a proposed research program and the policy
implications for upland development projects

II. RESPONSES TO POPULATION PRESSURE

The major factors affecting population pressure
can be classified according to their direct effects on
population growth -- fertility, mortality, and
migration. The complicating aspect is that the major
determinants of these factors are not identical (Grigg,
1976). With respect to fertility, for example, Cassen
(1976) has observed, using Food and Agriculture Organi-
zation (FAO) data, that global population growth rates
(although seldom falling below one to three percent per
year since 1920) are very much below biologically
feasible potentials for reproduction.[4] Fertility is
thus largely socio-culturally determined -- by the
practice of delayed marriages, social restraints on
sexual activity, infanticide, and continuous lactation.
These practices have been important in reducing the
lifetime reproductive potential of women from over
forty offspring to about nine (Grigg, 1976).[5] However,
with respect to mortality, the significant factors have

been largely technical and are related to the control
of endemic diseases, famines, and epidemics (Dumond,
1965).

Demographic Pressure and Technical Change

Boserup (1965) has shown that the most important
factor affecting technical change in agriculture is
population pressure on resources and that the major
response to pressure is the shift to more intensive
land use techniques as population density increases.[6]
Thus, a succession from forest-fallow to annual cropping
occurs along with changes in farm implements and land
tenure patterns.

Related to Boserup's (1965) density measure is the
notion of optimum population -- that population, where
output per head is maximized given resources and
technology (Grigg, 1976). Two approaches have been
suggested regarding the measurement of optimum popula-
tion (Carr-Saunders, 1922; Dumond, 1965).

The first approach relates optimum population in
a community to a given living standard, measured in
number of calories required to sustain a population.
However, this is not always useful because of the
difficulty of measuring proper living standards. For
example, in the Philippines the minimum nutritional

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intake from fats is 25 percent of the daily diet, 50 to 60 percent carbohydrates, and at least 63 grams of high quality animal protein (FAO, 1970). Using the results of 52 weeks of record-keeping in two Tiruray villages in Cotabato Central, Philippines, Schlegel and Guthrie (1980) show that for shifting cultivators, the nutritional levels were lower than the average recommended for the Philippines but that the Tiruray cooperators appeared "vigorous and healthy men with no overt evidence of nutrient inadequacy, fully able to live active and strenuous lives."[7]

Also nutritional levels might be more a function of proximity to markets than optimal population. For example, the same study shows major changes in diet as the Tiruray population moved from shifting to permanent cultivation since regular contact with the market allowed the purchase of more nutritious food.[8]

The second approach equates optimum population with the carrying capacity of the land. Allan (1965) defines this as "the maximum population density the system is capable of supporting permanently in that environment without damage to the land."[9] Thus, the concept of carrying capacity implies a fixed limit to the productive activity that can be supported by a

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given environment. While production below this limit can continue indefinitely, attempts to exploit the environment beyond this limit will lead to a breakdown of the entire system. However, while it is clear that specific human communities have indeed gone beyond the immediate capacity of a specific resource for sustained production, these cases specifically refer to problems introduced by particular periods of environmental stress or from the transition process of a community being abruptly incorporated into external markets. In both these cases, the abruptness or random aspects of change prevent successful adaptation from taking place (Cohen, 1977).

Several attempts at measuring carrying capacity levels have been made (Conklin, 1961; Street, 1969; Brookfield, 1963) for shifting cultivation systems, but most of the approaches have overlooked the need for an adequate synchronic description of climate, vegetation, and changes in soil erosion (Netting, 1974). Clarke (1966) suggests that a more direct measure would be to devise indicators of a decrease in biological diversity within an ecosystem. For example, changes in crop rotational sequence (leading to monoculture) relative to population density is a sign of breakdown in the

system.

Such rotational changes are often motivated by the
pressing need to shorten fallow periods to support more
people on the land. Using several case studies of
shifting cultivation communities in the tropics, Gourou
(1966) estimates that a decrease in the fallow period
from 24 to 9 years increases potential population that
can be supported from 12 to 30 persons per square
kilometer.[10] A similar estimate is made by Hanks (1972)
for several Southeast Asian rice-growing communities
where shifting cultivation techniques had an average
population density of 12 persons per square kilometer,
compared to the broadcast-type of production system
which supported 98 persons per square kilometer, and
the transplanting type of rice production, sustaining
an average of 381 persons per square kilometer.[11]

Changes in Land Use and Intensification

Intensification, following Boserup's (1965) model
of demographic stress, means that (1) more of the total
land area is placed under cultivation and (2) the
length of natural replenishment from forest fallow is
shortened. When population growth depresses average
output sufficiently to lower current living standards,
the community will switch over to a new technique that

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improves average output despite the general reduction
in the fallow period. In most cases this would mean
introducing higher yielding varieties and fertilizers
or using a new and shorter crop rotation scheme.[12]

Conklin (1961) estimates that, based on the
Mindoro Hanunoo system, around 8 to 15 years of natural
regeneration is needed for tropical forests. However,
this type of cultivation cycle has changed dramatically
even among traditional shifting cultivation communi-
ties. For example, among the Ikalahans in the
mountains of Nueva Vizcaya, Aguilar (1982) reports that
the mean fallow period is only 5.8 years in a swidden
(or uma) cycle of 10 years. In the watershed area
above Lake Buhi in Camarines Sur, which is less remote
and more accessible to a lowland market, the fallow is
for 2.2 years in a cultivation cycle of 4.4 years.[13] In
general, the trend is toward a cultivation cycle based
on the annual cropping calendar of the dominant sub-
sistence crop. For example, in Pantic, Antique,
Tapawan (1981) notes that in upland rice-growing areas,
the land is allowed to rest only during May and
April.[14]

In addition, estimates of population density for
indigenous shifting cultivation communities in the

Philippines show that even in the remote forested areas in the country, the man-land ratio has increased, making current subsistence patterns of production inadequate. Eder (1982) reports that the pioneer Cuyunon swidden farmers in Palawan, who in the early periods of settlment had up to 24 hectares of land for cultivation, now farm only an average of 3.3 hectares.[15] Excluding land owned by outsiders (which is about half of total land area), population density is now close to 200 persons per square kilometer. Intensification of agricultural lands has thus taken place so that income from subsistence production accounts for only 29 percent of total income while income from sales of agro-forestry products contributes a much larger share of household income (71%).[16]

While the dominant theme so far has centered on Boserup's (1965) population growth and technical change model, there have certainly been other factors of major importance that have intervened in the relationship between demographic stress and institutional and technical change. Two elements that have been significant with respect to their effect on the development of upland communities and, at the same time, have been present in the history of less developed countries in

Southeast Asia, are the influx of lowland migrants into upland areas, and the penetration of commercial markets into the local economy. We discuss these separately in the next two sections.

III. THE EXTENT OF MIGRATION IN THE UPLANDS

Although information is still tentative, there is much to be learned about the broad elements of lowland-upland migration movements, such as stages, distribution, numbers, and direction. An attempt is made here to systematically analyze the extent of fontier migration to the uplands.

The focus of measurement is on lowland-to-upland movements, although it is recognized that even within the uplands, evidence has pointed to some migration of population from one upland area to another. For example, the Cordillera Central mountain range in Northern Luzon has experienced some population flux -- the Ifugaos moving to the Sierra Madre in Isabela, the Kankanai occupying the Zambales mountains, and the Kalingas mixing with the Ilonggos of Quirino province (Olofson, 1982). Aguilar (1982) describes the south-ward movement of the Ikalahans from Imugan, Nueva Vizcaya to the Caraballo mountains in Capintalan, Nueva Ecija, for the period 1930 to 1950. Some groups also

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engage in temporary out-migration -- for example, the Bontok tribe moving to nearby mines and urban centers as wage laborers but periodically returning to the village to perform traditional ceremonies (Prill-Brett, 1982).

Methodology and Approach

The major sources of migration data are the National Census and Statistics Office (NCSO) national census of 1960 and 1970. The census data provide information from which both the volume and direction of migration streams can be studied and allows the inclusion of two reference points concerning population distribution and growth at the municipal level. For each period analyzed, the population growth of each municipality is statistically compared with the growth rate of the region and the province as a whole, to indicate the areas which experienced the largest increase in population.

To focus on upland migration, a sample of upland communities was taken, corresponding to the Bureau of Forest Development (BFD) integrated social forestry listing for 1983. The municipalities and provinces included under the BFD represent 71 percent of the entire social forestry program in the Philippines

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(Bernales, Sagmit, and Bongales, 1982). Table 1 gives
a breakdown by region, province, and number of munici-
palities sampled. Map 1 shows the geographic
distribution and location of the municipalities.

Two types of estimates are made from the data.
The first method calculates the proportion of migrant
population by comparing place-of-birth data in the
different time periods and evaluating shifts in place-
of-residence in 1960 cross-classified with place-of-
residence in 1970. The second method uses the census
survival ratio, which measures the difference between
net population and natural population change (Kim,
1972).

The estimates for both approaches are compared
with regional and provincial trends so that areas above
the regional (or provincial) average rate of growth may
be said to have a greater degree of inward movement of
population. While the procedure is largely inferential
regarding actual population movements, when combined
with other evidence, a reasonably comprehensive picture
of the developmental stages in upland migration
emerges.

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Major Limitations of the Study

While the methods allow for an extensive coverage of the population and analysis at the municipal level, several limitations are apparent. First, there are no explanatory variables included in the data that describe the reasons behind migration, the decision process in the choice of destination areas, and the dynamics of actual movements. Secondly, as is true of any type of census data, the information generated is static so that movements in between census years are not captured. Fleiger (1977) points out that the exclusion of this information biases the estimation of number of migrants by about half the total amount registered for the intercensal period.

The third limitation is related to information regarding characteristics of migrants. The only available source that breaks down population movements by age-sex grouping and direction of movement is the National Demographic Survey (NDS). Data concerning average family income and land availability, for example, will need to be inferred from other sources of information. Lastly, problems concerning the definition of upland areas and frontier migrants, plus the inherent weaknesses associated with reliability (and

consistency) of census data preclude evaluation on a comprehensive scale.

Framework and Definition of Migrants

Perez (1978) adopts the following definition of migrants as "persons who moved across migration-defining areas and incurred a change of residence during specific time interval."[17] Using this definition, migrants can then be classified in terms of the : (1) frequency with which they change residence, (2) historical period or migrant settlement stage that movement took place, and (3) time interval or duration of movement.

In the first classification, three major groupings are found: (1) chronic migrants -- who move 2 to 3 times and to different directions, (2) return migrants -- who move back to the area of origin, and (3) stable migrants -- who move once and stay in the place of destination. In the NDS, about 19 percent of the total enumerated migrants in the country were classified as chronic and 7 percent as return migrants (Herrin, 1982).

For the second classification, Madigan, Costello, and Palma (1982) elaborate on Browning and Feindt's (1969) description of "pioneer" vs. "mass" migrations.

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Relating this distinction to the Mindanao migratory
movements, migrants are said to be "pioneers" when they
move during the early periods of settlement, and where
transportation and communication networks need to be
established. The "mass" migrants come after a settle-
ment had been organized so that pioneer migrants tend
to be more "qualified and risk-taking, and skillful."[18]
With respect to upland population movements, the pro-
portion of pioneer migrants into the frontier provinces
of Mindanao in 1960 was 43 percent, and 12 percent were
mass migrants into settled areas.[19]

The third type of classification (which will be
used in this paper) measures the volume and type of
migration movements directly from the data. Three
general groupings are usually made: (1) lifetime
migrants -- those whose place of birth differs from the
place of residence at the time of enumeration, (2)
short-distance migrants -- whose place-of-birth and
place-of-residence varied within the region, and (3)
long-distance migrants -- whose place-of-birth and
place-of-residence varied inter-regionally (Perez,
1978). For the last two groupings, migration-defining
areas follow the standard twelve-region scheme of the
Philippines.[20]

In terms of the proportion of upland communities to the total population, our estimate shows that as of 1970, around 11 million (10,934,476) people reside in the upland communities listed by BFD. This represents about 29.8 percent of the total Philippine population of 36.7 million in 1970 and slightly over a half (55.5 %) of the total migrant population. Of the 11 million upland residents enumerated in 1970, 25.6 percent (2,801,196) are classified as lifetime migrants, which represents 7.6 percent of the total national population. The figures indicate that indeed the uplands comprise a large percentage of the population and a significant proportion of the overall migration movement (see Table 2).

Table 3 compares estimates of migration volume for the 1960 and 1970 intercensal period on the national level (using Smith, 1976 and Perez, 1978) and our own estimates for upland areas. For 1960, the proportion of inter-regional lifetime migrants in the BFD communities studied is slightly lower (10.9%) than the national average of 12.8 percent. However, in 1970, the proportion of lifetime migrants in the uplands of 18.3 percent is significantly larger than the national average of 13.6 percent, indicating that

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the average rate of growth of the upland migrant

population is much greater than the national average.

With respect to inter-regional movements, upland

migrants tend to be less mobile (11.9% changing their

region of residence), compared to the national average

where 76.4 percent (Smith, 1976) or 51.2 percent

(Fleiger, 1977; Perez, 1978) are said to have changed

residence across regional boundaries. In terms of

inter-provincial population movements, an opposite

trend can be observed -- 88.1 percent of upland

migrants changing residence in 1960, in contrast to the

national average of 11.3 percent. These trends are

consistent with Fleiger's (1977) analysis of 1960-1970

migration patterns where a positive correlation between

inter-regional in-migration and intra-provincial

population movement for agricultural frontier areas was

found.

National Migration Trends

A comprehensive study of internal migration was

completed in 1976 UNFPA-NCSO entitled, Geographical

Patterns of Internal Migration in the Philippines,

1960-1970, which contains a bibliography of the major

studies on internal migration in the Philippines. For

pre-1960 migration patterns, the studies made by

Pascual (1965) and Kim (1972) provide a comprehensive computation of net inter-provincial and inter-regional migration rates. In Kim's (1972) analysis, the census survival ratio method is applied to the 1960 male and female population.

With respect to intercensal (1960-1970) migration, the most comprehensive estimates (aside from the UPPPA-NCSO study) have been those presented by Smith (1976) and Perez (1978), using data from the 1973 NDS, which provided valuable background information on migrant characteristics. Several other studies have completed analyses of the census estimates and a good summary is presented in Fleiger (1977), and more recently, in Herrin (1982).

In general, migration takes place even before half of presumed population limits are reached given the existing economic situation so that factors other than economic hardship directly enter the decision process. Based on an expanded explanatory model for migration behavior, Zachariah and Pernia (1975) and Pernia (1977) show that (1) total population in 1960 at the place of origin, (2) average family income in 1965 at the place of destination, and (3) total area of unused agricultural land in 1973 at the place of desti-

nation, explained 45 percent of total variation in inter-regional migration. Pernia (1977) concludes that "once the income gain criterion is achieved, the final decision on destination must meet other criteria such as familial needs."[21] This is consistent with Zosa's (1973) findings that socio-economic "pull" factors are closely related to inter-provincial flows rather than "facilitator variables" such as ethnic affiliation or distance. Thus areas of destination have been towards frontier settlements or urban centers where employment opportunities are greater.

Direction of Migration and Migrant Characteristics

Two stages of population movements appear to be consistently relevant in the studies completed. First, an earlier birth-to-1960 -- or 1965 in Pernia (1977) -- phase has been identified solely with rural-to-rural migration, which is characterized by the dominance of frontier destinations. The UNFPA-NCSO (1976) estimates that about 33% of the rural-to-rural flow end up in the frontier upland areas.[22]

The second stage (1965-1973) is characterized by the sustained heavy influx of rural migrants to urban centers (mainly Manila) and a significant reshuffling of population among the Southern Tagalog provinces.

During this period, in-migration to frontier areas continued but a lower proportion to the total population than in the pre-1960 period.

With respect to the direction of migration flows, Pleiger (1977, citing Bogue, 1959) offers the convenient definition of migration stream as a "a body of migrants that departs from a common area of origin and arrives at a common area of destination during a specified migration interval."[23] As of 1970, there are 132 identified migration streams in the country, but only 12 are significant (involving 50,000 or more migrants). The important inter-regional streams affecting frontier settlements are those from (1) Central and Western Visayas to Southern Mindanao, (2) Central Visayas to the Zamboanga peninsula, (3) Quezon and Southern Tagalog provinces to the Kalinga-Apayao, Mountain Province, Zambales area, (4) Davao del Sur to Agusan del Sur and South Cotabato, (5) Samar and Leyte to Northern Luzon, (6) Bicol to Palawan and Mindoro, (7) Bicol to North Mindanao, and (8) within Mindanao, from the Northern to the Southern and Western Mindanao provinces. Map 2 shows the direction of movement of these dominant streams.

The destination of migrants have tended to attract

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particular age-sex groupings. Perez (1978) estimates
that for the total migrant population, the general sex
ratio is 94.8, which reflects the predominance of
females. She argues, however, that the sex selectivity
for females is found mostly in the younger population,
the difference being significant in the 15-24 age
group. With respect to destinations, the young female
migrants comprise the bulk of period migrants to urban
centers, specially in areas with abundant service
industries. As age increases, the sex ratios become
dominantly male only until age 65, since female morta-
lity rates are significantly lower than for males.[24]

In the frontier migration streams, a larger
proportion of males is found among lifetime, long-
distance migrants. Wernstedt and Semkins (1965) study
of the settlement of Mindanao shows that in the pre-
1960 period, the male-female ratio was 101.8, and this
increased to 108.8 in 1960, with frontier provinces
having a larger (109.9) ratio than the settled areas
(106.1).[25]

With respect to age-selectivity, in general
migrants tend to be older than non-migrants. Among the
migrant population, period migrants are younger, the
majority being single (never-married) and female. Urban

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migrants belong mostly to the 15-34 age grouping but no
similar age selectivity can be found in the frontier
migration streams. For example, in Mindanao, there is
little age difference between settled and frontier
areas. Wernstedt and Semkins (1965) show that Bukidnon
province, which has the largest influx of population
between 1948 to 1960, has an age pyramid similar to
Misamis Oriental which experienced the largest popula-
tion loss in Mindanao. They conclude that "rather than
being selective for young adults, the migration into
Mindanao, especially since World War II, appears to
have been primarily a family movement involving all
ages."[26]

Population Movement in the Uplands

Table 4 contains a summary of total population in
the BFD upland communities for the period 1903 to 1970.
For all regions, the highest growth rates occurred
during the early pioneer settlement phase from 1903 to
1939 and during the postwar period from 1948 to 1960.
Across regions, the largest rates of increase in popu-
lation are in Mindanao where population doubled on the
average for all intercensal years. In Central and
Southern Mindano, the areas where government resettle-
ment programs were concentrated, population increased

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by almost 100 percent in the period 1903 to 1918.

With respect to the national growth rate, Table 5 shows that on the average, the nation's population increased at a faster rate than the BFD upland communities, which can be attributed to differences in fertility and mortality rates. In addition, the data indicate that the upland population is about 30 percent of the total population for all intercensal periods although natural growth rates were generally lower than the national average.

Migration Volume and Distance

Migratory movements have been extensive in the BFD upland communities studied. The 1970 census indicates that 18.3 percent of the population for all ages was born in another region. Within the region, 21.2 percent were born in a province other than their current place of residence (see Table 6).

The net lifetime migration rate for all regions is 28.5 percent, which means that about a third of total population in the uplands was born in a place other than their current place of residence. The highest migration rates are in the Mindanao provinces--Region 10 with a lifetime migration rate of 37.7 percent, Region 11, 42.8 percent, and Region 12, with 40 per-

cent. In Luzon, the region with the largest proportion of lifetime migrants is Region 4, which is partly explained by the heavy influx of populations into Palawan and Mindoro (see Table 6).

With respect to migration distance, place-of-birth enumeration is compared with place-of-residence information at the provincial and regional levels. Of the total number of lifetime migrants, one-half were inter-provincial migrants and 47.4 percent migrated inter-regionally. As expected, the Mindanao region has the largest percentage of inter-provincial and inter-regional population movements.

Intercensal migration can be observed by comparing place-of-residence in 1960 with enumerated place-of-birth data. For the entire sample, a significantly large percentage (78.8 %) of migrants moved residence in the ten-year period. There is less movement in Mindanao intra-regionally compared to the two Visayas regions which have been traditional out-migration areas.

Net Migration Estimates

Indicators of rapid population redistribution are the differences in rate of population growth at the provincial and regional levels, and the proportion of

lifetime migrants in an area. In the preceding section, using 1960 and 1970 data, we have computed the proportion of lifetime migrants to the total population.

In this sub-section, we discuss another measure of migration volume by estimating the difference between net population change and natural population increase through the Census Survival Ratio Method. The ten year period (1960-1970) survival ratios for five-year age groups in the sample upland communities are presented in Table 7.

The survival ratio method assumes that during the intercensal period, the national population is closed and that mortality rates are the same for the nation as a whole. The ratio of total population by age-sex group to that of the total is the same cohort in both censuses (Kim, 1972). However, for our purposes, we calculate net population change from migration as a comparative measure to lifetime migration rates using place-of-birth information. In Table 8 the estimates of inter-provincial movement are provided by region for the male and female population.

A large number of migrants belong to the three age groups ranging from 15 to 29 years (about 30%). This

is consistent with Perez's (1970) observation that migrants tend to be young, while residents in the area of destination are much older, resulting in extremely high age differentials between native and migrant settlers. As a result, in-migration areas have an age pyramid that reflects its relatively young population. Smith (1976) argues that the age-sex selectivity of migrants could have a significant effect on changes in nuptiality patterns and fertility. He adds: "... the migrant selectivity in terms of income and education, both of which are correlates of fertility, could directly affect overall area fertility in both sending and destination areas."[27]

Migration Streams to the Uplands

The National Demographic Survey (NDS) in 1973 (based on a sample of total enumerated population in 1970) presents migration direction (and flow) from areas of origin to particular destination centers. Of the 32 significant streams (with 50,000 or more population), the frontier movements comprised about half of of total flows. Unlike the urban (or suburban) streams, where Rizal and its neighboring provinces are the main areas of destination, the frontier movements are generally dispersed. The largest frontier streams

originate from the Central and Eastern Visayas area and move towards Mindanao. (The West Visayas migrants have a preference for Southern Mindanao.) In Luzon, the major receiving upland areas are those in Benguet, Ifugao, Mountain Province, Palawan, and Marinduque.[28]

Counter-flows are insignificant in the frontier streams. The Central Visayas-Southern Mindanao migration stream, for example, has a net transfer turnover ratio of 68 to 1. Perez (1978) concludes that in general for every ten migrants moving to the uplands, less than three engage in a counter flow.

Population Density in the Uplands

Density of populations with respect to a fixed resource base indicates population pressures on the resource over time. Levi (1976) point out, however, that the density measurement does not reflect differences in fertility so that an area may have a high population density not because pressure on resources is heigh but because the land and climate are productive. In this case, the population density measure will be proportional to the productivity of the land rather than to demographic pressure on resources (Helleiner, 1966).

Notwithstanding this, population density remains

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an important measure of environmental stress (darity, 1980). For example, higher population density has been found to be positively associated with the presence of intensive cultivation methods as land becomes scarce so that each unit of land is used with greater frequency. Under forest-fallow cultivation, where population densities are low, a longer fallow period allows the land to revert to natural vegetation for some years (Conklin, 1961; Netting, 1976).

Tables 9 and 10 contain estimates of population density for the BFD upland communities for the period 1903 to 1970. In the early period from 1903 to 1939, population density increased by 30 percent. Between 1960 and 1970, population density increased by 20 percent. (Indeed for the same period, the Mindanao provinces showed an increase of 35 percent.)

Inter-regionally, the Southern Mindanao provinces experienced the highest rate of increase in population density of 71 percent between 1903 and 1970. Within Luzon, the largest increase (35%) is found in the Sierra Madre, Zambales, and Caraballo Mountain areas of Zambales, Nueva Ecija, and Pangasinan provinces.

Using Conklin's (1961) 200 persons per square kilometer carrying capacity, except for Region 9 that

has an unusually high population density of 388, Southern Mindanao (Region 12) with 198 persons per square kilometer, and Region 8 with 184 persons per square kilometer, there were no critically overpopulated upland regions as of 1970. (Of course, this needs to be evaluated with respect to existing soil conditions.)

When compared to the national average population density of 140 persons per square kilometer (Perez, 1978) and the 370 persons per square kilometer maximum density for lowland rice-growing areas (Hanks, 1972), the average population density in the uplands of 103 appears low. However, since differences in land fertility are greater cross-sectionally in the uplands due to variations in gradient, soil type, and climate, the present density figure may in fact be close to the limits of the system's carrying capacity.

IV. CHANGES IN PRODUCTION AND MARKETING SYSTEMS

The population density measurements presented in Part III indicate that pressure on resources occurs as individuals are prevented from arbitrarily extending resource boundaries -- a process that is normally associated with land extensification. Given increasing population pressure, a shifting cultivation community is faced with the choice of either diffusing stress through some form of fertility reduction or temporary out-migration or by meeting the challenge directly by introducing new production techniques.

While there are different forms which population movements may take, historical trends suggest that these will continue to be of minor significance in the alleviation of environmental stress. This is so since much of present-day pressures from population growth are directed towards increased intensification. The push towards more intensive methods will occur if population growth continuously impinges on a community's ability to provide for itself, given a limited land base (Darity, 1980).

Two other sources of demographic pressure on resources will be discussed in this section. These are (1) increased government intervention and (2) penetra-

tion of commercial markets. The inclusion of these factors expands Boserup's (1965) original model by showing that government programs and markets can place additional pressure on resources that may be independent of population growth in the uplands. We present our arguments by identifying the major stages of development of agriculture in the uplands and indicating how government policies and markets have affected the process of intensification of production.

Two Stages of Demographic Stress

Two stages can be identified broadly in terms of population density. The first stage occurs in the initial phases of internal migration where movement is completely free so that frontier areas operate under conditions of constant returns to land and labor, or what is called the "land surplus economy." Population density at this stage would be proportional to the productivity of the land rather than to the direct effect of population pressure on resources (Helleiner, 1966; Levi, 1976).

The second stage is when population growth continuously impinges on the community's ability to meet subsistence needs (Darity, 1980). As the land becomes scarce, the density measure now reflects the influence

between a people's consumption behavior and production strategy which forces the population to alter consumption habits and work patterns. Boserup (1965) associates demographic pressure on resources with a succession from extensive to intensive land uses. Cohen (1977) adds that the transition to more intensive techniques occurs as the alternative of migrating elsewhere is restricted either by institutional constraints or by the lack of opportunities for employment.

We contend that the institutional restrictions on population movements are conditioned by the unique nature of commercialization of the market economy in the uplands, and by the different government programs which have tended to accelerate pressure on resources.

The Land Surplus Stage

The pre-1960 population movements to frontier destinations have been concentrated in areas primarily unused due to location (i.e., distance from major growth centers). For example, the growth of total cultivated area in Mindanao exhibited the highest rate of increase during the period 1948 to 1960 -- from 809,400 hectares in 1948 to more than 1.7 million hectares in 1960. Pernitedt and Simkins (1965) estimate that assuming each settler family cultivates 4

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hectares, there could still be enough fertile land in
1960 to support an additional 605,000 settler
families.[29]

Prior to the establishment of public land laws,
frontier settlements were started primarily through
mission stations that later developed into important
urban centers (e.g., Cagayan de Oro, Zamboanga). In
1903, alienable and disposable lands were sold or
leased up to a maximum of 1,000 hectares per indivi-
dual. (This system of land titling became the
predecessor of what is now known as plantation agricul-
ture or _haciendas_ in the lowlands and logging
concessions in the uplands.)

Agriculural colonies were then established in 1913
through a subsidized migration plan in seven areas in
Mindanao -- six in Cotabato and one in Lanao. In 1937,
the National Land Settlement Administration (NLSA) was
established, and by the end of the year, 30,000 to
35,000 persons had been resettled in Mindanao. Other
areas were then opened up such as the Koronadal and
Allah valleys.[30]

After the Second World War, the NLSA was replaced
by the National Resettlement and Rehabilitation
Administration (NARRA) which extended direct financial

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support to migrants through procurement of seedlings and credit for equipment. By 1948, total government involvement in migration in Bukidnon represented over one-fifth of total migration in the province.[21]

While forest lands had been occupied close to the margin by 1965 (as borne out by our population density estimates), government programs for settlement still continued, primarily to alleviate congestion in Metro Manila and to resettle families affected by government projects. Some relocation of communities into virgin forest occurred in the 1970s -- San Pedro Resettlement Site (Aguilar, 1982); Pantabangan (Flores, 1980); Angat (Calanog, 1977); and Ambuklao and Binga (Llapitan, 1977) watershed areas. In 1972, the Bureau of Forest Development (BFD) resettled 300,000 to 600,000 families at a cost of ₱22,000 per settler-family.[32]

Land Scarcity Stage

While population growth in the uplands during the land-surplus stage has been largely influenced by government intervention -- either through land titling of alienable and disposable lands or through planned resettlement -- in the relatively land-scarce stage, pressure on resources is influenced by the growth of commercial markets. However, it is important to point

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out that government policies still continue to be significant but that the demands of external markets are much greater at this stage of development than in the land surplus stage. Since the government owns 18.6 million hectares or 62 percent of total land area in the country (as of December, 1980), government programs will continue to be important in upland development for the coming year.[33]

Role of Markets in Upland Development

The intrusion of commercial markets into the local economy has often resulted in the increasing reorganization of economic transactions along market lines (Wharton, 1969). While production for home consumption still makes up a significant component of total production, the trend has slowly been toward the "interlinkage" of markets for agricultural outputs with factor markets (Bardhan, 1980). As Bardhan explains: "... we do not necessarily refer to formal or organized or monetized markets. Any transaction in the services of these factors based primarily on economic principles

The major indicators of market penetration and the consequent commercialization of the local economy are the (1) increased monetization of household labor, (2) increased proportion of output for sale over output for

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home consumption, (3) conversion of agricultural lands to cash croppng and adoption of more intensive production techniques, and (4) dominance of middlemen and their monopsonistic control over the market.[35]

Wharton (1969) has shown that the transition to a market economy can be seen in the increasing ratio of hired labor to labor for agricultural production. Tapawan (1981) reports that in Tamtic, Antique, 47 percent of total household income comes from non-farm, wage income. Family labor comprises only 15 percent of the agricultural labor force since household members engage in seasonal out-migration.[36] In the Mountain Province, Prill-Brett (1982) describes the periodic migration of Bontok males to nearby mines and urban areas as wage laborers. Also in Sta. Cruz, Camarines Sur, near the Buhi watershed area, a little over one-half (55%) practice swidden agriculture as a full-time activity while the rest are full-time wage laborers. About 32.5 percent of households have at least one wage earning member, 23 percent with children as the sole wage earners, and 23 percent with the female spouse as wage earner. Additionally, in 38.5 percent of households the male family head is also a wage earner (Aguilar, 1982).[37]

to the city marketplace and sell them either in bulk or
retail. With respect to output from swidden activi-
ties, 56 percent are sold and 32 percent are consumed,
the remainder being fed to livestock.[42]

Schlegel (1981) presents a detailed comparative
description of two types of upland communities in the
northern forested areas of Cotabato. The study high-
lights the differences in subsistence patterns between
Figel, the traditional village, and Kabakaba, the
commercialized (peasant) village. In Figel, majority
of output from swiddening is locally consumed, and the
only market contacts are for the purchase of salt,
cooking pots, beddings, and other goods not produced
locally. In contrast, Kabakaba is dependent on the
market for subsistence. The following description
illustrates the types of changes that accompany
commercializaten.

> ...Kabakaba people do almost no hunt-
> ing or fishing. They buy their fish and meat
> in the local Nuro market. And, in like
> manner, with the forests gone, so too are the
> main sources for any significant gathering ..
> the contrast between subsistence activities
> of Figel and Kabakaba is nowhere more
> striking than in the almost total elimination
> of the hunting, fishing and gathering factors
> ... the marketplace has become a central
> economic institution.[43]

Market Transactions

The central place and location theory model proposed by von Thunen indicates that a close correlation exists between intensity of land use and location of markets (Hall, 1966). Farming systems with high inputs of labor and capital per unit area are found near the market, followed outwards by progressively extensive arable systems. Orlove (1977) notes that a vertical trade pattern develops among the different altitudinal zones which specialize in a particular crop. A multi-level network of markets and traders is then organized around particular commodities.

Examples of complex trading systems in Southeast Asia can be found where shifting cultivators themselves engage in actual trading. Dunn's (1975) ethnographic account of Malayan aboriginal tribes, which includes archaeological evidence, suggests that the Orang Asli forest-dwellers and their predecessors maintained a lively trade selling such products as rattan, wild rubber, camphor, and other oils to middlemen. Among the Iban of Sarawak, their indigenous legal system provides for a "tax" on traded goods such as brasswares and ceramics from China. Padoch (1978) observes that for some Iban men, the extended trading trips across

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the peninsula are associated with relieving short-term pressure in densely-settled areas.[44]

Pelzer (1966) adds that shifting cultivators, who also engage in active trading, tend to be more diverse in their production strategy. He cites the Buginese of Southern Sulawesi (Celebes) who have been for centuries one of Indonesia's earliest mountain traders to China, exporting several goods such as rubber, pepper, coffee, copra, and benzoin.[45]

For the Philippines, the correlation between distance of makets and intensity of production appears consistent with available data. Schlegel's (1981) description of two Tiruray shifting cultivation communities in Cotabato, shows that the sedentary, peasant community was closer to the market and thus maintained regular contacts with traders than the swidden-based, traditional community where market contacts were limited to purchase of a few items not produced by the village.

Different types of produce are marketed according to their demand. In Hamtic, Antique, Tapawan (1981) notes that cash crops (corn, mungo, coffee, peanuts) are brought to the market through bullcarts. Middlemen who travel by jeep purchase livestock and firewood at

farm gate prices, and sometimes engage in copra and
mango trading.

Aguilar (1982) observes the practice of exploita-
tive barter trading among the Tinggian tribe in Abra
and lowland merchants. A tin of bagoong (fish-salt
condiment) is exchanged with 25 cans of upland rice --
the former costing P2.00 and the rice, P6.00 or a price
hike of about 200 percent. One basket of salt is sold
at P7.41 while its price in the market is only P1.00.[46]

In Aguilar's (1982) survey of marketing arrange-
ments, 58 percent of respondents in Buhi, Camarines
Sur, preferred to sell their own products in the low-
land market rather than middlemen. Among the Ikalahan,
62 percent of respondents claim that the market prices
of their products were much lower than the amount they
could get at the Sta. Fe market. In the marketing of
tiger grass, for example, only 18 percent sell tiger
grass as raw material, and 48 percent engage in the
trading of finished tiger grass brooms so they could
get a better price.[47]

Figure 3 presents the different kinds of market
outlets for upland products. Note that in the case
studies cited throughout the paper, around 50 to 60
percent of produce are sold to town traders and 30 to

40 percent to upland village traders, who in turn sell
80 to 90 percent to middlemen and "warehouse" buyers in
the major market center of the province. A small
percentage goes directly to consumers and these are
sold mostly by women.

V. POLICY IMPLICATIONS AND RESEARCH PROGRAM

The general conceptual approach derived from the
relationship of population pressure and technical
change described in Part II provides a method of
looking at upland development with a greater sensiti-
vity to the underlying causes of change. An attempt is
made to evaluate the cause and effect of population
pressure by relating population growth to scarcity of
resources and intensity of farming.

In Part III the extent of population pressure is
quantified through an analysis of migration volume and
direction of movement. The evaluation focuses on the
rate of growth of upland population from migration with
respect to age-sex composition of migrants.

The arguments in Part IV provide alternative
approaches to the measurement of "pressure" on
resources by relating changes in production technology
to market demands and government programs. A descrip-
tion of some upland marketing systems is presented

following a hierarchical delivery system for production outputs. A few (and necessarily tentative) conclusion are reached regarding the relationship between market proximity and production intensity. In this section we summarize some of the policy implications and future research requirements.

1. Understanding the Meaning of Pressure on Resources

The census data obtained for the sample upland communities in this study indicate the importance (at least in numbers) of the forest sector in society. The high proportion of lifetime migrants (18.3%) illustrates that the movement of population to the uplands has occurred even long before the extensive margins for agriculture had been reached. This implies that factors other than population pressure may have contributed to the migration process such as government intervention in resettlement, problems in land tenure, lack of employment opportunities, etc.

The socio-economic factors affecting population movements may in fact operate independently of natural population growth and we have tried to show how markets can stimulate changes in production and shifts in settlement patterns. We have also argued that the penetration of outside markets and government interven-

tion activities may lead to greater intensification of
production even before population densities have
reached the limits of carrying capacity. An examina-
tion of how markets operate to induce changes in
production must be made with respect to the govern-
ment's program for credit, road building, an other
extension support.

2. Deciding on Social Forestry

The need to pinpoint the exact population of the
uplands becomes more apparent when programs such as
social forestry are introduced. This is so since know-
ledge of the total population and spatial distribution
of upland communities is usually the first step in
defining priorities for development.

However, without a solid empirical basis for the
problem of population pressure, social forestry
programs (and more recently, people's forests) will end
up encouraging rapid in-migration without corresponding
conservation approaches and extension support.

3. Assessing Government Programs

The evidence presented in this study points to
government as a major intervening factor in promoting
technical change. Market accessibility, for example,
may be enhanced through government built trails (or

MAP 1

Location of Integrated Social Forestry Project Communities Included in the Demographic Study (1978)

MAP 2

DOMINANT INTER – PROVINCIAL AND
INTER – REGIONAL MIGRATION STREAMS,
INTEGRATED SOCIAL FORESTRY PROJECT
COMMUNITIES, 1970

(migrant population of 10,000 persons
and above)

```
┌──────────────┐
│     gabi     │─────────── lowland market (100%)
│     68%      │
└──────────────┘
                            raw materials (18%)
┌──────────────┐
│  tiger grass │
│     18%      │
└──────────────┘
                            finished broom-- "naked," "souvenir," &"hinilot"   (48%)

                            lowland market (22%)
┌──────────────┐
│    ginger    │
│     47%      │
└──────────────┘
                            upland market (78%)


                            lowland market (47%)
┌──────────────┐
│    Swine     │
│     57%      │
└──────────────┘
                            upland market (53%)
```
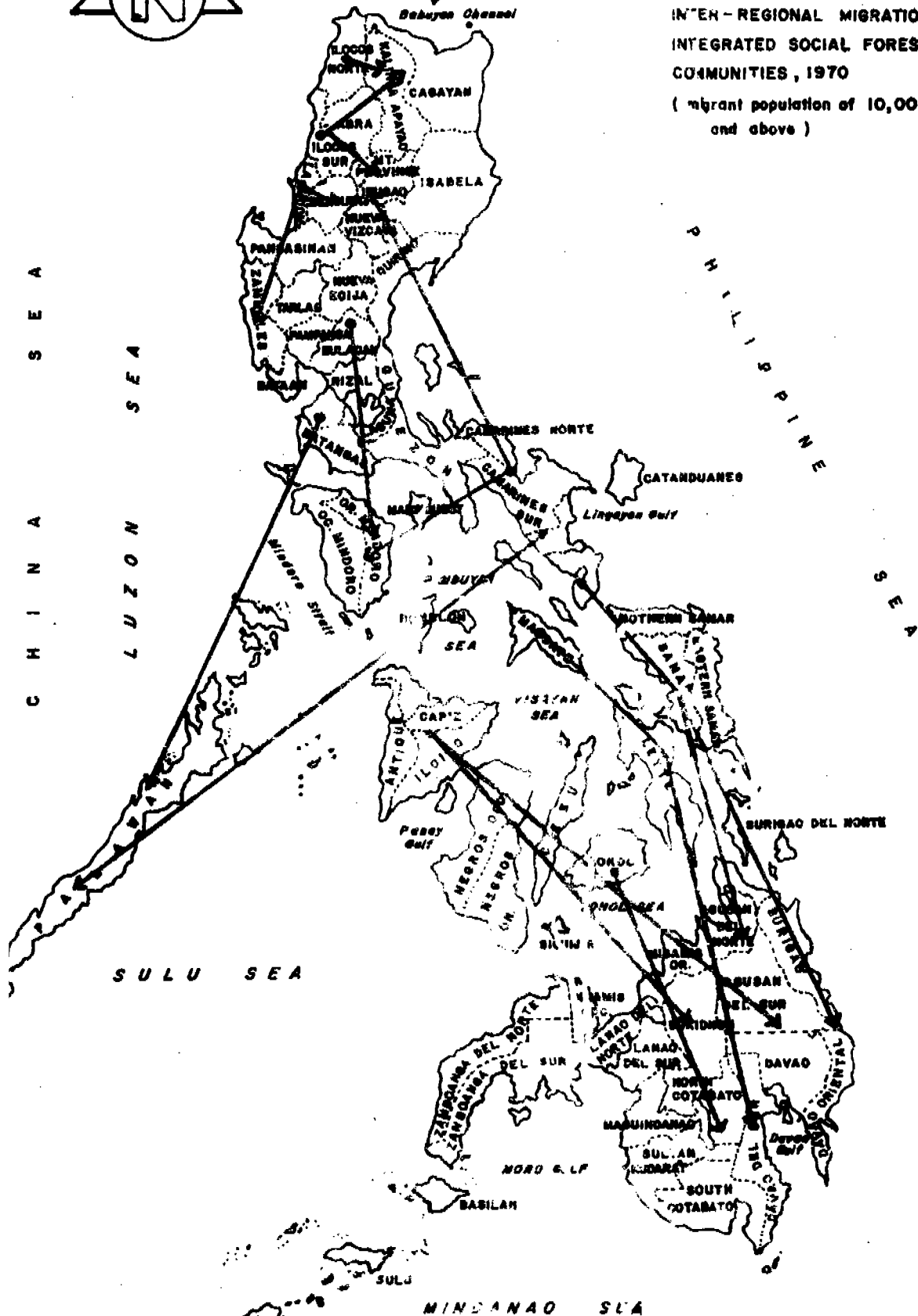
FIGURE 1.   THE IKALAHAN COMMODITIES MARKET

Source: Data based on survey results reported in Filomeno Aguilar, Jr. (1982).   Social Forestry
          for Upland Development: Lessons From Four Case Studies, (Q.C.: Institute of Philippine
          Culture, Ateneo de Manila University), p. 33-40.

```
┌─────────────┐        ┌─── home consumption & given to relatives  19%
│ Root Crops  │────────┤
│    100%     │        │              ┌─── lowland market 90%
└─────────────┘        └─── sold 65% ─┤
                                      └─── upland market 10%

┌─────────────┐        ┌─── home consumption 76%
│  Cereals    │────────┤
│    46%      │        │
└─────────────┘        └─── bartered (mainly fish)  34%

┌─────────────┐        ┌─── home consumption 41%
│  Fruits     │────────┤
│    46%      │        │
└─────────────┘        └─── sold 23% (upland market only)

┌─────────────┐        ┌─── home consumption 17%
│ Vegetables  │────────┤
│    16%      │        │
└─────────────┘        └─── sold 83% (lowland market only)

┌─────────────┐        ┌─── home consumption & celebrations 51.5%
│  Chicken    │────────┤
│   82.5%     │        │
└─────────────┘        └─── sold 48.5%

┌─────────────┐        ┌─── home consumption 93%
│   Swine     │────────┤
│   42.5%     │        │
└─────────────┘        └─── sold 7% (lowland market only)

┌─────────────┐        ┌─── home use 46%
│  Carabao    │────────┤─── sold 27%
│   27.5%     │        │
└─────────────┘        └─── rented 27%
```

Figure 2. BUHI UPLAND DEVELOPMENT PROJECT COMMUNITIES' COMMODITIES MARKET
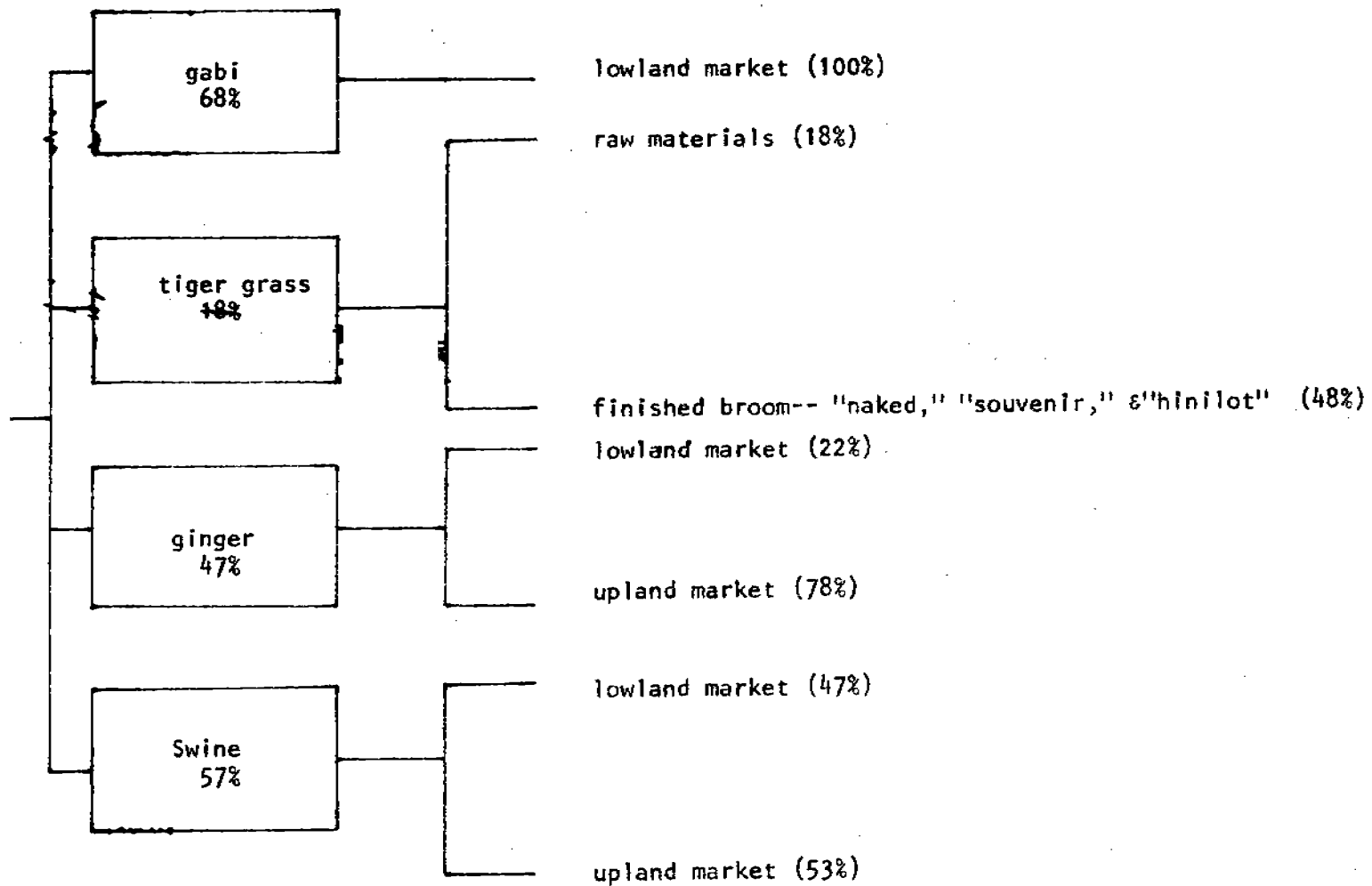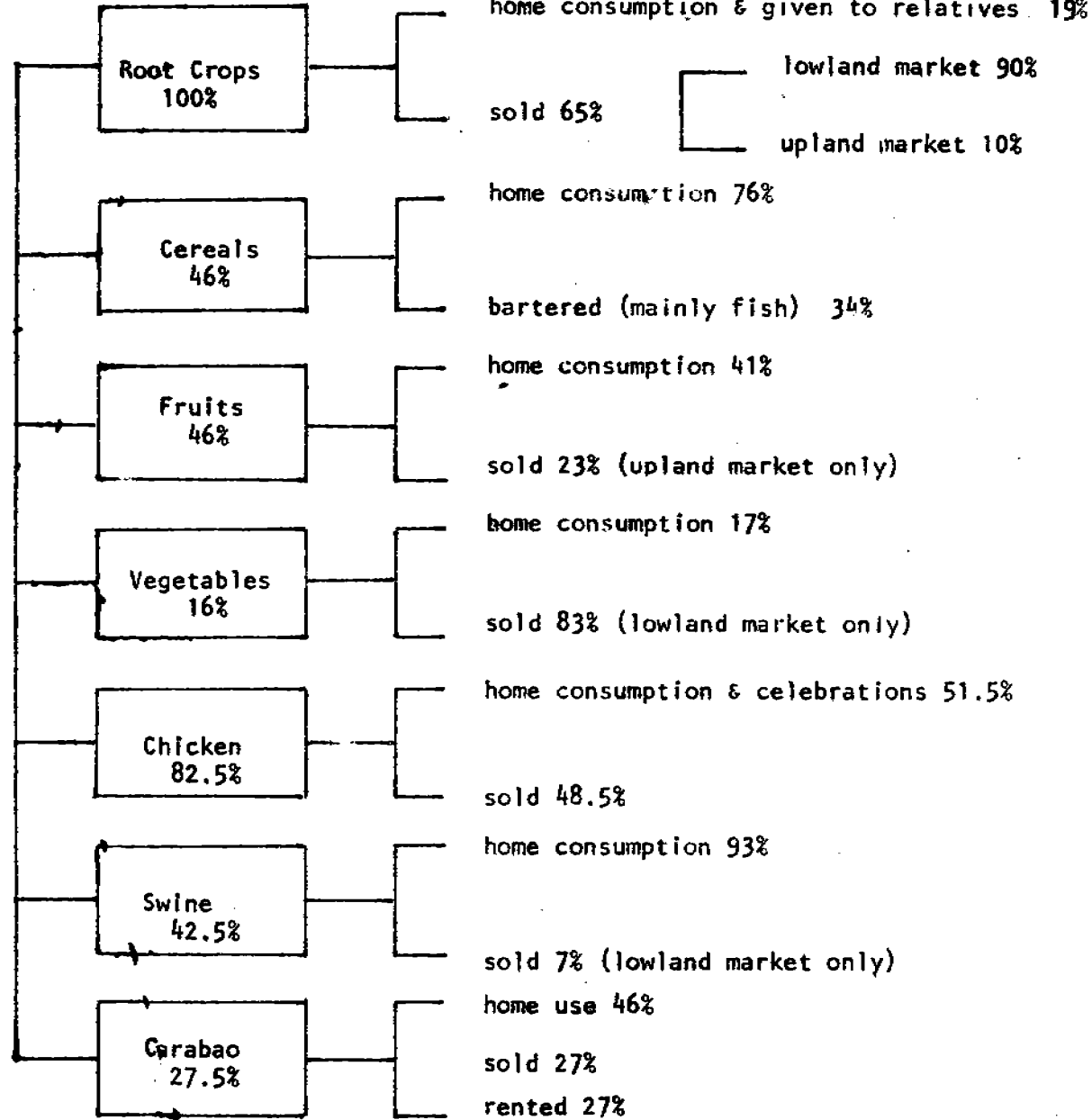
Source: Data based on survey results reported in Filomeno Aguilar, Jr. (1982). <u>Social Forestry for Upland Development: Lessons From Four Case Studies</u>, (Q.C.: Institute of Philippine Culture, Ateneo de Manila University).
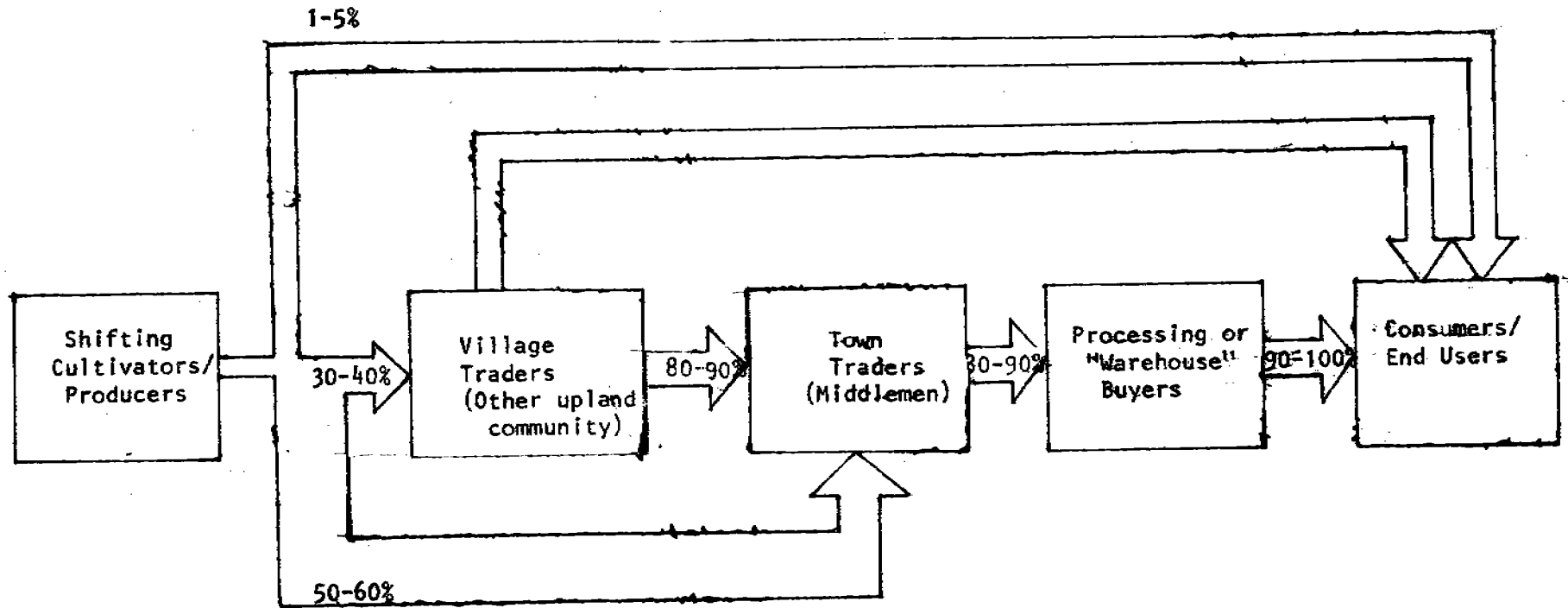
FIGURE 3. General Marketing System for Upland Products.

Table 2. VOLUME OF LIFETIME MIGRATION IN INTEGRATED SOCIAL FORESTRY
COMMUNITIES BY REGION IN 1970

		Total Lifetime Migrant Population	Percent of Total Population
All Regions		2,797,983	25.6
REGION:			
1.	Ilocos Region	156,169	13.1
2.	Cagayan Valley	97,161	19.0
3.	Central Luzon	126,759	21.1
4.	Southern Tagalog	235,159	29.6
5.	Bicol	196,318	20.6
6.	Western Visayas	173,424	16.9
7.	Central Visayas	259,715	21.0
8.	Eastern Visayas	80,884	17.7
9.	Western Mindanao	180,502	30.3
10.	Northern Mindanao	327,534	33.8
11.	Southern Mindanao	757,270	42.5
12.	Eastern Mindanao	207,088	33.2

Table 11. Estimates of Population Density By Region For Integrated Social
Forestry Communities, 1903-1970.

Region	Total Land area (sq. km.)	Population Density (Persons/Sq. km.)					
		1903	1918	1939	1948	1960	1970
All Regions	100,783	18	27	46	57	82	103
Region							
1. Ilocos Region	7,433	47	75	108	104	115	160
2. Cagayan Valley	5,846	13	30	43	47	65	88
3. Central Luzon	4,688	26	39	63	72	82	128
4. Southern Tagalog	20,096	9	13	21	27	25	39
5. Bicol Region	7,336	40	52	84	138	114	143
6. Western Visayas	14,456	8	11	17	21	63	71
7. Central Visayas	9,410	3	10	28	31	106	131
8. Eastern Visayas	3,078	36	54	94	100	127	184
9. Western Mindanao	1,534	19	58	171	190	551[1/]	388
10. Northern Mindanao	8,815	12	19	33	52	76	110
11. Southern Mindanao	14,932	4	15	26	31	70	119
12. Eastern Mindanao	3,159	1	16	34	51	130	198

[1/] A possible error in census enumeration may account for the wide
discrepancy in the estimate.

Source: For land area, BFD listing for 1983, census data taken from NCSO
(1970).

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2. John F.S. Levi (1976). "Population Pressure and Agricultural Change in the Land-Intensive Economy," Journal of Development Studies , 13:61.

3. William C. Clarke (1976). "Maintenance of Agriculture and Human Habitats Within the Tropical Forest Ecosystem," Human Ecology, 4(3):253.

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5. The reproductive life of a woman extends roughly from 15 to 145 years while a man is ordinarily fertile from the ages of 15 until death. The UP-PI estimate of crude birth rate for the Philippines in 1970-1975 is 37.4 per thousand population. See E. A. de Guzman (1970), "Trends and Differentials in Fertility," Population of the Philippines, (Bangkok, Thailand: UN-ESCAP).

6. Population density relates the number of persons to total available land area. Levi (1976) argues, however, that the density measurement assumes that land is homogeneous and that agricultural conditions respond to varying levels of density. For shifting cultivation, land quality variations are important so that we can expect a high density of population in an area because the land is productive, not because population pressure on resources is high.

7. Stuart A. Schlegel and Helen A. Guthrie (1980). "Diet and the Tiruray Shift From Swidden to Plow Farming," J. R.K. Robson (ed.), Food, Ecology and Culture: Readings in the Anthropology of Dietary Practices, (New York: Gordon and Breach Science Publishers), p. 19.

8. Schlegel & Guthrie add: "..the nutrient intake of the traditional Tiruray, who   augment this swidden farming with considerable exploitation of wild resources is much more erratic than that of the peasant Tirway, who deal with the market on a regular basis. Such variations in intake do underline the need for caution in generalizing from short-term records in a traditional society." ibid., p. 19.

9. W. Allan (1965). The African Husbandman, (Edinburgh: Oliver and Boyd), cited in Robert Mc. C. Netting, "Agrarian Ecology," B. J. Siegel, A. R. Beals, & S. A. Tyler (eds.), Annual Review of Anthropology, 3:49, 1976.

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12. Clarke (1966) observes that the shift to more intensive systems is characterized by alternating the planting of leguminous fodder plants with the main subsistence crop.

13. Filomeno Aguilar, Jr. (1982). Social Forestry for Upland Development: Lessons From Four Case Studies, (Quezon City: Institute of Philippine Culture, Ateneo de Manila University).

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15. Eder, James F. (1981). "From Grain Crops to Tree Crops in a Palawan Swidden System," Harold Olofson (ed.) Adaptive Strategies and Change in Philippine Swidden-based Societies, (Los Baños: Forest Research Institute), p. 92-93. The terms Shifting cultivation and Swidden are used interchangeably in this paper.

16. Ibid., p. 93-94.

17. Aurora E. Perez (1978). "Internal Migration," ESCAP, Population of the Philippines, (Bangkok, Thailand: UN-ESCAP), p. 44.

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19. Frederick L. Wernstedt and Paul D. Simkins (1965). "Migration and the Settlement of Mindanao," Journal of Asian Studies, Vol. 25, p. 88-90.

20. With respect to actual distance effects for short-and long-distance migrants, interprovincial migrations are not measured so that the movement to a province in another region may in fact be shorter in distance from an inter-provincial movement within the same region.

21. Ernesto M. Pernia (1977). Individual and Household Migration Decision in the Philippines, Paper presented to Symposium on Household Economics, (Manila: IEDR Discussion Paper No. 77-01), p. 26.

22. Perez' (1978) ranking of provinces by net migration states shows that South and North Mindanao rank second and third (to Manila) in the overall pre-1960 movement.

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25. Wernstedt and Simkins, op.cit., p. 91-92.

26. Ibid., p. 100.

27. Peter C. Smith (1976). "The Changing Character of Interregional Migration in the Philippines," Philippine Geographical Journal, 20(4), 156-157.

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31. Ibid.

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Table 3. Estimates of National Migration Rates Compared with Estimates Using Integrated Social Forestry (ISF) Communities as the Sample.

Percent of Enumerated Population	National Migration Estimates		ISF Communities Estimate
	Smith[1]	Perez[2]	
1. living in different province of birth (1970)	17.6	-	21.2
2. living in different region of birth (1960)	13.8	12.6	10.9
living in different region of birth (1970)	13.6	13.2	18.3
4. moving to another province (1970)	71.2	7.10	50.3
5. moving to another region (1970)	52.4	54.1	47.4
6. inter-provincial migrants changing regions of residence (1970)	76.4	51.2	11.9
7. inter-provincial migrants changing province of residence (1970)	11.3	11.0	88.1

[1] Peter C. Smith (1976). "The Changing Character of Integrated Migration in the Philippines," Philippine Geographical Journal, 20(4); 146-162.

[2] A.E. Perez (1978). "Internal Migration," Population of the Philippines, (Bangkok, Thailand: UN-ESCAP), p. 44-78.

Table 4. Population growth in Integrated Social Forestry Communities By Region, 1903-1970.

REGION	1903	1918 Number	1918 Percent Increase	1939 Number	1939 Percent Increase	1948 Number	1948 Percent Increase	1960 Number	1960 Percent Increase	1970 Number	1970 Percent Increase
All Regions	1,839,000	2,888,359	36	4,670,253	38	5,698,759	18	8,243,557	31	10,725,064	23
Region:											
1. Ilocos Province	351,692	555,226	37	800,909	31	772,180	3.6	858,682	10	1,188,934	28
2. Cagayan Valley	95,596	173,135	56	253,747	32	276,835	8.3	379,371	27	511,753	26
3. Central Luzon	94,683	140,300	33	228,491	39	263,455	13.3	383,302	31	599,262	36
4. Southern Tagalog	120,929	184,346	34	295,511	38	338,153	12.6	508,771	34	793,377	36
5. Bicol Region	185,442	247,045	25	430,326	43	546,881	21.3	826,692	35	951,274	12
6. Western Tagalog	293,501	380,391	23	616,290	38	1,013,285	39.2	908,494	10	1,021,760	11
7. Central Visayas	394,344	520,002	24	756,672	31	802,083	5.7	999,839	20	1,236,072	19
8. Eastern Visayas	110,150	161,116	32	240,952	33	307,226	21.6	390,495	21	456,403	14
9. Western Mindanao	29,045	89,477	68	262,951	66	291,945	9.9	846,182	66	595,423	-29*
10. Northern Mindanao	103,269	165,941	38	288,128	42	462,482	38	672,599	31	966,831	30
11. Southern Mindanao	57,399	221,506	75	387,863	43	462,903	16	1,048,770	16	1,779,839	41
12. Eastern Mindanao	2,950	49,874	94	108,413	54	161,331	33	410,360	61	624,136	34

*Possible data error in census enumeration.

Source: Republic of the Philippines, National Economic & Development Authority (1970). Integrated Census of the Population and Its Economic Activities, (Manila: NEDA-NCSO), Table 1-2

Table 5. Growth Rates for Total (National) Population and Sample Upland Communities,
1903-1970.

Intercensal Period	Total Population	Annual Growth Rate	Population in Sample Upland Communities	Annual Growth Rate	Percent of Upland Population to Total Population
1903	7,635,426		1,839,000		24
1903 - 1918	10,314,310	2.03	2,888,359	3.06	28
1918 - 1939	16,000,303	2.11	4,670,253	2.31	29
1939 - 1948	19,234,182	2.07	5,698,759	2.24	30
1948 - 1960	27,087,685	2.89	8,243,577	3.12	30
1960 - 1970	36,684,486	3.08	10,725,064	2.67	29

Source: Republic of the Philippines, National Economic and Development Authority (1970).
Integrated Census of the Population and Its Economic Activities, (Manila: NEDA-
NCSO), Table 1-1.

Table 6. Volume of Lifestime Migration in Integrated Social Forestry Communities By Region in 1970.

Region of Residence in 1970	Percent of Enumerated Population Born in:*		
	Same Municipality	Same Province	Same Region
All Regions	71.5	78.8	81.7
Region:			
1. Ilocos Region	87.1	92.1	92.6
2. Cagayan Valley	81.1	87.6	88.6
3. Central Luzon	76.3	80.6	82.6
4. Southern Tagalog	68.8	76.9	78.4
5. Bicol Region	72.0	80.7	90.0
6. Western Visayas	81.2	91.1	92.9
7. Central Visayas	79.1	83.2	91.2
8. Eastern Visayas	68.0	75.5	93.2
9. Western Mindanao	69.5	75.2	76.0
10. Northern Mindanao	62.3	68.1	71.9
11. Southern Mindanao	57.2	62.2	63.0
12. Eastern Mindanao	63.0	66.3	73.2

*Each column was divided by the total enumerated population, except for residents born abroad or birthplace not stated.

Source: Republic of the Philippines, National Economic and Development Authority, (1970).
Integrated Census of the Population and Its Economic Activities, (Manila: NEDA-NCSO),
Vol. 1, Table IV-9.

Table 7. Migration Distance Streams in Integrated Social Forestry Communities By Region of Residence in 1970.

Region of Residence in 1970	Percent of Total Migrant Population[1] Migrated Within:		Percent of Total Migrants Remaining within Province of Residence in 1960
	Same Province	Same Region	
All Regions	49.7	52.6	21.2
Region:			
1. Ilocos Region	43.0	56.5	7.4
2. Cagayan Valley	34.0	65.0	12.4
3. Central Luzon	43.1	45.1	19.4
4. Southern Tagalog	54.3	55.8	23.1
5. Bicol Region	47.3	56.6	19.3
6. Western Visayas	27.7	29.5	8.9
7. Central Visayas	29.7	29.9	8.8
8. Eastern Visayas	56.5	74.2	24.5
9. Western Mindanao	18.7	55.5	24.8
10. Northern Mindanao	17.0	63.4	31.9
11. Southern Mindanao	11.8	50.9	37.8
12. Eastern Mindanao	17.0	40.6	33.7

[1] divided by total enumerated population with birthplace different from municipality of residence at time of enumeration.

[2] divided by total enumerated population with birthplace different from province of residence at time of enumeration.

Source: Republic of the Philippines, National Economic and Development Authority (1970). Integrated Census of the Population and Its Economic Activities, (Manila: NEDA-NCSO), Vol. 1, Tables IV-7 and IV-11.

Table 8. Census Survival Ratios* for Males and Females By Five-Year
Cohorts for Integrated Social Forestry Communities, 1960-1970.

Age in 1960	Male	Female
0-04	0.934	0.921
05-09	0.873	0.912
10-14	0.856	0.967
15-19	1.021	1.009
20-24	0.981	1.042
25-29	1.021	0.931
30-34	0.971	0.843
35-39	0.854	1.052
40-44	0.912	1.024
45-49	0.836	0.948
50-54	0.976	1.083
55-59	0.936	1.052
60-64	0.739	0.862
65-69	0.715	0.758
70-74	0.583	0.703
75 +	0.341	0.423

*The census survival ratio is estimated from the following formul

$$M_{t_o} = P_t - S (P_o)$$

where M = net migration
P_t = population at time t
P_o = population at base period
S = survival ratio

Source: Yun Kim (1972). "Net Migration in the Philippines, 1960-1970,"
Journal of Philippine Statistics, 23(2): 10. Data taken from
NCSO (1970).

Table 9. Estimates of Net Migration For Males and Females Using
the Census Survival Ratio Method* for Integrated. Social
Forestry Communities (1960-1970).

	Region	Both Sexes	Male	Female
All Regions		2,869,631	1,539,188	1,330,443
Region				
1.	Ilocos Region	141,543	67,344	74,199
2.	Cagayan Valley	80,454	37,853	42,601
3.	Central Luzon	128,018	59,415	68,603
4.	Southern Tagalog	215,489	112,991	102,498
5.	Bicol Region	177,824	86,328	91,496
6.	Western Visayas	162,840	83,392	79,448
7.	Central Visayas	301,969	175,617	126,352
8.	Eastern Visayas	75,706	36,393	39,313
9.	Western Mindanao	171,030	85,028	86,002
10.	Northern Mindanao	330,612	168,697	161,915
11.	Southern Mindanao	771,172	415,715	355,457
12.	Eastern Mindanao	312,974	210,415	102,559

*The census survival ratio is estimated from the following formula:

$$_t M_o = P_t - S (P_o)$$

where   M = net migration

P_t = population at time t

P_o = population at lose period

S = survival ratio

Source: Yun Kim (1972), "Net Migration in the Philippines, 1960-1970,"
Journal of Philippine Statistics, 23(2): 10. Data taken from
NCSO (1970).

Table 10. Estimates of Population Density By Region for Integrated
Social Forestry Communities, 1960 and 1970.

Region	Total Land Area (sq. km.)	Total Population		Population Density (Persons/Sq. km	
		1960	1970	1960	1970
All Regions	100,783	8,243,557	10,725,064	82	103
Region					
1. Ilocos Region	7,433	858,682	1,188,934	115	160
2. Cagayan Valley	5,846	379,311	511,753	65	88
3. Central Luzon	4,688	383,302	599,262	82	128
4. Southern Tagalog	20,096	508,771	793,377	25	39
5. Bicol Region	7,336	836,692	951,274	114	143
6. Western Visayas	14,456	908,494	1,021,760	63	71
7. Central Visayas	9,410	999,899	1,236,072	106	131
8. Eastern Visayas	3,078	390,495	456,403	127	184
9. Western Mindanao	1,534	846,182[1]	595,423	551[1]	388
10. Northern Mindanao	8,815	672,599	966,831	76	110
11. Southern Mindanao	14,932	1,048,770	1,779,839	70	119
12. Eastern Mindanao	3,159	410,360	624,136	130	198

[1] A possible error in census enumeration may account for the wide discrepancy in the estimates.

Source: For land area, BFD listing for 1983; census data taken from NCSO (1960 & 1970)