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An Estimate of Cropping Production and Value in Thailand's Forest Reserves from the 1988 Village Census

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The 1988 survey of Thailand's rural villages was undertaken in accordance with the Cabinet decision in September 1987. The Cabinet took the occasion also to endorse the recommendation of the Committee of Economic Ministers (The Economic Cabinet) for a biannual survey of all villages outside urban areas. Although there had been two such previous surveys in 1984 and 1986, the decision meant that such comprehensive socioeconomic surveys of rural Thailand would continue to be conducted on a permanent basis every other year. The rural area is defined as all villages situated outside the urbanized enclosures of sanitary *(suka-piban)* and municipal districts. For the year 1988 such villages *(muban)* numbered 56,296. These rural entities, the lowest-level local administrative units, form part of the higher administrative units of 6,361 subdistricts *(tambon),* attached to 731 districts *(amphoe)* and 72 provinces *(changwad).*

The survey questionnaire is known as the NRDC 2C Form, the acronym NRDC standing for the National Rural Development Committee. The first NRDC 2C survey undertaken in 1984 was an attempt to identify a class of "poor" rural villages as a target group to which all efforts of the government's anti-poverty program were to be directed exclusively. Later, the program's aim was modified; the target group became all rural villages, in response to whose revealed needs the government would implement a differentiated program of rural support and development.

There are a maximum of 493 variables pertinent to the socioeconomic profile of each village contained in the 1988 NRDC questionnaire. The data constitute the single largest set of information that depicts Thailand's contemporary rural profile.

The Rural Profile

Nearly all of Thailand's farmers, and most of the poor, live in rural areas. The NRDC 2C census presents a composite picture of Thailand's agricultural production, income, and social conditions: the data define the degree and incidence of Thailand's rural poverty, log the current changes in rural socioeconomic parameters, and depict the country's current rural profile.

The 1988 survey's demographic data showed that Thailand's rural population totaled 34.2 million, consisting of 6.6 million households in basic communities of 56,296 villages. A rural household averaged 5.2 persons, and a village averaged 600 persons, or 120 households.

The Thai rural community is not isolated. There were 38 television sets for every 100 households, 74 percent of which had electricity. It is mobile. Less than 2,000 villages, or only 3 percent of the total number, had no direct road connection to the local district town or amphoe from which access to the country's highways network is assured; 52 percent of all the villages had regular or scheduled passenger buses, minibuses, or motorcycle services throughout the year; and a further 30 percent had such services on an irregular and occasional basis for part of the year during the rainy season. For every 100 rural households, there were 56 bicycles, 26 motorcycles, two converted farm transport vehicles *(e-tan),* and four pick-up trucks.

Occupation and livelihood indicators showed that 4.3 million, or 66 percent of the rural households, owned the land on which they worked; 11 percent rented supplementary land, and 9 percent worked on wholly

rented land. Two-thirds of the total number of households (not necessarily the same set that worked their own land) owed part or all of their subsistence to rice farming. The overwhelming majority of them (3.9 million, or over 90 percent) produced a single rice crop per year, the rest either occasionally or regularly harvested two crops. Nineteen percent of the villages cited the lack of water as the reason for the farmers' frustrated second cropping. One-half of the total number of rice farming households harvested paddy from over 6 rai of land, 35 percent of them from 6-20 rai. Of all the rural households, 13 percent regularly engaged in dry season cash cropping. Fifty-two percent used fertilizers, and 42 percent used insecticides. Thirty percent of the households owned draft animals, and 6 percent rented them either exclusively or to supplement their own animals. Eleven percent owned small tractors or mechanized hoes with tracks, while 19 percent rented them. Less than one percent owned farm tractors, while 22 percent rented them. The rural labor force is comprised of 18.5 million persons belonging to the 14 to 50 year old age group, with 23 percent, or 1.5 million rural households, having members who migrated for all or part of the year to work outside their subdistrict or tambon area.

The public education and health infrastructures that had been extended and developed over the years were very much in evidence and were shown to have delivered effective basic services to the rural community. Education indicators showed that 63 percent of the total current rural population of all age groups had passed through the four-year compulsory education system. Although primary school enrollment is universal, only 4.4 percent had received a secondary-level education. On the other hand, only 0.87 million, or 4.7 percent of the 14 to 50 year age group, were illiterate. Fifty-six percent of all the villages had primary schools within the village grounds, and 97 percent of all the subdistricts in which the villages were the subordinate parts had a primary school.

Health indicators showed that the rural infant mortality rate averaged 12 per thousand live births up to one year old; maternal deaths averaged 6 per one thousand live births. Seventy-five percent of rural families practiced some form of birth control. Ninety-seven percent of the villages had had over 75 percent of the children in the compulsory schooling age group vaccinated under the government's primary health care program. Of all the rural households, 61 percent had septic tank toilets, while 32 percent still had no toilets of any kind. Of all the subdistricts in which the villages were the subordinate parts, 94 percent had a government health center. Of all the rural children up to five years old, 17 percent were classified as malnourished, mostly of the level 1 (the least severe) standard. The government ran official daycare centers in 8 percent of the villages; 16 percent had nursery schools for children of preschool age.

The above summary picks out rather arbitrarily some of the more salient features of Thailand's rural profile, a composite picture that covers two-thirds of the country's total population of mostly farming householders, for almost all the agricultural land in use. The NRDC 2C village census is uniquely comprehensive in both coverage and design. The questionnaire data take stock of the prevailing socioeconomic situation and the public service infrastructure, the rural householders' occupations, and their predominantly agricultural production and income. The very broad spectrum of indicators within the scope of the census may overlap or duplicate parts of other surveys that are more narrowly focused and more narrowly based in terms of the underlying sample population size and the area covered. However, parts of the NRDC survey are census data that cover practically all households and all of the population engaged in certain types of activities or livelihoods. And because the census is repeated every two years, the NRDC 2C data also provide useful dynamic information on such groups or subclasses of the population making their living in geographically well-defined areas. The farming population, and the various subgroups of rural householders engaged in different cropping activities are cases in point. In this respect, the NRDC survey is an agricultural census.

Cropping Income

Section 2 of the NRDC questionnaire dealing with occupational and livelihood indicators depicts in detail and in depth the production and income derived from agricultural activities. The section covers the number of households, the cropping area, the yield, the farmgate price or the market value, and a host of other variables (the uses and types of fertilizers, for example) relating to the production of all major and some minor crops. Since agricultural activities take place and farming households live almost exclusively in the

rural areas—defined by the questionnaire as non-urban—the NRDC 2C survey in this section approximates a national census of agricultural production and income. However, because the agricultural variables can also be cross-tabulated with other village-level socioeconomic data, the census can point out some unexpected and surprising perspectives that could drastically revise our perception of certain issues. For example, the 1988 NRDC survey data revealed that 12,360 villages, or 22 percent of the total number of 56,296 rural villages, were situated in areas that are still legally parts of Thailand's National Forest Reserves. Some 1.6 million households in these villages, which constitute 24.3 percent of the total 6.6 million Thai rural households, are living in and working on encroached forest lands.

The NRDC 2C questionnaire covers the production quantities and the value of gross income derived from 20 listed categories of rural household occupational activities (except cottage industries) relating to the agriculture sector. The respondent village indicates the number of its households deriving income under each of the 20 categories. Because a household may be involved in more than one category of activities, the total number of households listed for all the categories of occupational activities may exceed the number of actual households in the village. Following the first category of rice cropping, short-term and long-term upland cropping are classified as two separate categories; the respondent village can list up to three common types of upland crops grown under each category, in terms of the number of farming households involved.

Production quantities and the unit price—the "typical" farmgate or market value per unit received by the producer—are assessed on the basis of the mode value (the most frequently occurring one) for the respective crop. Short-term upland crops are defined as those with a planting cycle time of less than four months to harvesting, such as maize (for cattle feed), mung bean and soya bean, but not including vegetables. Long-term upland crops are those with more than a four-month planting cycle time, such as sugarcane, tapioca, jute, castor, cotton, pineapple, etc.

The production and income derived from upland crops listed under short-term and long-term croppings exclude all the other crops appearing under other listed categories. Dry season cropping—a separate category on its own—is defined as the cropping of all short-term crops and vegetables grown for sale only during the dry season. "Other tree crops" include coconuts, conifers, oil palm, coffee, cocoa, and cashew. "Other crops" are those not in the short- and long-term crop varieties nor appearing elsewhere in any other given category of activities; they include such miscellaneous crops as bamboo, mushrooms, and mulberries for silkworm rearing.

The subsequent sections of this article attempt to present an approximation of the extent—in terms of relative and absolute areas—and the production value of upland crops in encroached areas of Thailand's forest reserves. The 1988 NRDC 2C village census data permit estimates to be made which differentiate between types of crops and between local administrative areas. The income derived from upland cropping constitutes an important part of the total rural income derived from all categories of agricultural activities, and it is perceived a priori to be the single most dominant category of income derived from working on encroached forest reserve lands, which cannot be legally owned nor, strictly speaking, legally farmed. Such lands are presumed to have been initially encroached and subsequently remained in use largely for upland cropping, which required relatively little investment outlays of a permanent or intensive nature.

The Data

The sections of the NDRC 2C data pertinent to the analysis are those dealing with short-term and long-term upland cropping. In the processing of the raw census data, named upland crops were assigned codes from a total list of 41 short-term crops and 11 long-term crops to cover any combination of the top three most common crops under each category identified by the respondent villages.

The data evidently needed to be either corrected or discarded in parts: obviously implausible ranges of values occurring in isolation and too far removed from the group mean, median, or mode statistics—which would otherwise affect the estimate of production quantities or their value in the aggregate—had to be rejected as uncorrected errors. Generally, the farmgate or market prices for the major crops reportedly

received by households which exceeded by 2.5 times or more the overall median unit value for the respective crop were considered unacceptable and were rejected offhand as data entry errors. By contrast, the low end of the price spectrum was left unmodified except for four major crops: the reported low price relative to the median value would be given the benefit of the doubt due to possible cases of poor quality and unfavorable and uncompetitive local conditions. To estimate more realistic values of production from the given data in the cases where the given price was considered obviously in error, either the respective provincial mode or the overall mode value was used in cases where the number of cropping villages was fewer than five for the entire province. The substituted range of pricing is shown in the 1988 Crop Price Table, which indicates the accepted range of the maximum and minimum reported price for various crops on the list of the twenty most commonly grown in terms of the number of reported cropping villages. Overall, the possible bias as a result of price substitution on the crops' estimated value of production would probably be on the side of underestimation, since the cases of reported extremely low prices for most crops were generally left unsubstituted.

There also appeared to be some confusion on the part of the respondent villages about whether to define some crops as short-term or long-term. Many crops appeared in both categories. Consequently, the observations bearing on all listed and unlisted short-term and long-term crops in the relevant sections of the questionnaire returns were consolidated into a single data file. Accordingly, the descriptive statistics were determined irrespective of a particular crop's identification (by the respondent villages) or its classification (by the census manual) as short-term or long-term. The analysis does not differentiate between the two categories.

In cases where the reported number of households engaging in any one cropping activity exceeded the total number of households for the village, the latter value from the general demographic section of the questionnaire was substituted instead as the possible maximum. And all cases were disregarded and excluded from the determination of all group statistics that implied an income level per household in excess of one million baht.

The Analysis

Altogether 32,667 villages indicated that they had households growing upland crops; of these, 9,833 villages, or 30 percent, were identified as being villages situated in national forest reserves. Of the 15,736 villages responding that they were growing more than one type of upland crops, 5,951, or 38 percent, were situated in forest reserves. And of the 3,472 villages responding that they were growing three types of upland crops, 1,485, or 42 percent, were in forest reserves. The data showed the proportion of forest reserves villages grew as the varieties of upland crops being grown in the villages increased. The greatest number of villages reported growing tapioca (15,570 villages), followed by maize (10,226 villages), mung bean (4,722 villages), groundnut (4,659 villages), jute (4,325 villages), and sugarcane (4,263 villages). The proportion of forest reserves villages was 34 percent for tapioca, 43 percent for maize, 32 percent for mung bean, 29 percent for groundnut, 35 percent for jute, and 25 percent for sugarcane.

For the listed 55 varieties of upland crops, there were 2,979 million cropping households, of which 1,222 million, or 41 percent, were residents of forest reserves villages. Tapioca cropping engaged the biggest group of 811,000 households, of which 331,100 were in forest reserves. Of the next largest group of 637,643 maize cropping households, over one-half, or 322,249, were from the forest reserves villages. The households of forest reserves villages growing these major two crops accounted for 53 percent of the total cropping by all households in all the forest reserves areas.

The gross income per household derived from an identified crop is first found from the census data on price, productivity, cropping area, and intensity reported for that particular crop for individual villages. The production value for the village is then determined from the number of cropping households. Differentiating between those villages which according to NRDC census data are situated within national forest reserves and others which are not, the village upland cropping data are then aggregated for all crops to show the total cash cropping income by province and by crop type. The 1988 Cropping Values by Province Table aggregates all data from the consolidated cash cropping file. The 1988 Cropping Values by Crop Table

aggregates the data limited to the classified varieties of upland crops. Not all the 55 classified short- and long-term upland crops had reported production value. The difference in the sum totals of production value of the two tables is marginal. The tables showing upland cropping in terms of land use—1988 Cropping Areas by Province and 1988 Cropping Areas by Crop—include data only for the 55 listed upland crops. Total cropping by volume is shown in the 1988 Crop Production in Tons Table.

The value of cash crops grown in encroached national forest reserves areas was found to be 42 percent of the total gross rural income derived from all upland cash cropping, amounting in 1988 to 20.7 billion baht. The provinces of Nakhon Ratchasima, Phetchabun, Udon Thani, Kamphaeng Phet, and Prachin Buri recorded the highest production value of upland cash cropping on encroached forest reserves land, each over one billion baht, amounting to 6.6 billion baht. The sum represents 54 percent of the total gross income derived from all upland cropping done in the five provinces, and over 13 percent of the value of all upland cropping in 1988. The same five provinces also topped the list in the area of forest reserves land encroached; together they accounted for 26.5 percent of the total encroachment, with Phetchabun and Nakhon Ratchasima each having over one million rai of forest reserves under crops. Of the total 29.7 million rai in use for upland cropping, 13.7 million rai, or 46 percent were in national forest reserves areas. Of the major crops, more maize and cotton were grown and more income was derived in forest reserves lands than from outside; in the case of upland rice, over three-fourths of the total rice planted took place in encroached forest areas. In absolute terms, the greatest use of national forest reserves for growing any single upland crop was for tapioca, amounting to 4.2 million rai, or over 30 percent of the total encroached areas of the national forest reserves under upland crops.

No discernible pattern was found in the differences in productivity within and outside the forest reserves. Forest reserves land was less productive by 9 percent and 5 percent, respectively for maize and sugarcane but more productive (6 percent) for tapioca, relative to non-forest reserve areas. The only single marked difference was for tobacco—which must be considered a special case since the questionnaire data and coding made no distinction between varieties, some of which are intensively cultivated under contract farming for specialized markets. The productivity differences for various crops between overall areas and forest reserves are shown for the more commonly grown crops in the 1988 Mean Productivity of Cropping Table.

The extent of the encroachment of national forest reserves areas as indicated in the foregoing analysis is by no means the full picture. There are other agricultural activities and other crops besides upland crops that must have also contributed to the total encroachment. If almost a quarter of all the rural households are already farming on forest reserves land, there can be no credibility in any attempt to maintain the reserves' present legal but fictitious boundaries. The extent to which other crops have added to the encroachment of the land within those boundaries will have to be further studied. What has been demonstrated sufficiently clearly and quantitatively from the 1988 rural village census data in the case of the upland crops was that over 40 percent of their entire annual output and almost one-half of the total land area needed to grow them were supported by the largely illegal use of Thailand's national forest reserves.
