

KNOWING, GATHERING AND EATING: KNOWLEDGE AND ATTITUDES ABOUT WILD FOOD IN AN ISAN VILLAGE IN NORTHEASTERN THAILAND

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ABSTRACT. — In societies undergoing economic and social transformation, the level of knowledge about local resources, and attitudes toward them, can be affected by a variety of factors including cultural identity, identification with local traditions, cultural transformations, economic status, education level, age and gender. To address the topic of what factors affect traditional wild plant use and knowledge in Northeastern Thailand we interviewed and tested male and female villagers in different age categories. Each interviewee was asked to identify and provide information about photographs of 40 wild food items. Additional information was obtained through ethnographic research in the village. The results indicate that there are gender differences in the use and procurement of wild food items. However, most villagers, despite their economic level, still prefer wild food over cultivated food. Using a knowledge and attitude test, it was also found that women are better able to identify items correctly, but that there are no gender differences in knowledge of other factors pertaining to the wild food items. Additionally, adults consistently scored higher than children. Consequently age, and thus indirectly, exposure to traditional subsistence practices, also is related to knowledge about wild food resources. Our results suggest knowledge about wild food is being lost within the community despite retention of the taste for these items and desire to retain them in the diet.

Key words: Thailand, wild food, food preference, gender, age.

RESUMEN.—En sociedades sometidas a transformaciones económicas y sociales, el nivel de conocimiento sobre recursos locales y actitudes sobre ella pueden ser afectadas por una variedad de factores, entre ellas la identidad cultural, identificación con tradiciones locales, transformaciones culturales, el estado económico, nivel de educación, edad y sexo. Entrevistamos y examinamos a varios aldeanos femeninos y masculinos de edades diferentes para exponer cuales factores afectan el uso tradicional y el conocimiento de plantas salvajes en la region Noreste de Tailandia. Se el pidió a cada aldeano que identificara cuarenta fotos de artículos de comida salvaje. Obtuvimos información adicional através de investigaciones etnográficas hechas en el mismo pueblo. Los resultados indicaron que existen diferencias en el uso y obtención de artículos de comida salvaje. Sin embargo, la

mayoría de los aldeanos, a pesar de su nivel económico, prefieren comida salvaje a comida cultivada. La única diferencia que se reveló usando pruebas de conocimiento y aptitud fue que las mujeres lograron mejores resultados identificando los artículos de comida salvaje correctamente. Adicionalmente, los adultos dieron resultados más altos que los niños. La edad, e indirectamente la exposición a prácticas tradicionales de subsistencia, también están relacionadas al conocimiento de comida salvaje se pierde ante la comunidad, a pesar de la retención del saber de éstos artículos y el deseo de mantenerlos en la dieta.

RÉSUMÉ.—Dans les sociétés qui entreprennent des transformations, le niveau de connaissance sur les ressources locales et les attitudes envers ces ressources, sont affectés par une variété d'agents inculant l'identité culturelle, l'identification avec des traditions locales, des transformations culturelles, le statut économique, le niveau d'éducation, l'âge et le sexe. Pour aborder le sujet des agents qui affectent l'usage traditionnelle des plantes sauvages et la connaissance des plantes au nord-est de la Thaïlande, on a fait des entrevues et on a examiné les homes et les femmes des villages d'âges différents. On a demandé à chaque sujet d'identifier et de donner des renseignements de quarante aliments sauvages qui ont été photographiés. Les informations supplémentaires ont été obtenu à travers la recherche ethnographique dans le village. Les resultants montrent qu'il y a des différences entre les sexes dans l'acquisition et l'usage des aliments sauvages. Cependant, la plupart des habitants du village, malgré leur statut économique, préfèrent les aliments sauvages aux aliments cultivés. Employant un examen de connaissance et d'attitude, on a également noté que les femmes sont meilleures à l'identification précise des articles mais il n'existe pas une différence de connaissance entre les sexes concernant les autres facteurs à propos des articles sauvages. De plus, les marques des adultes étaient invariablement plus hautes que celles des enfants. Par conséquent, l'âge, indirectement, ainsi que l'exposition aux pratiques traditionnelles de subsistance, fait également partie de la connaissance sur les ressources de la nourriture sauvage. Les resultants suggèrent que la connaissance des aliments sauvages est en train d'être perdue en dedans de la communauté en dépit du fait qu'ils retiennent le goût pour ces articles et leur désir de les retenir dans leur régime.

INTRODUCTION

Human-plant interactions are one aspect of a society's construction of nature and the landscape. Recently, researchers have begun to explore the factors that influence the knowledge people have about their environment. In particular, researchers have begun to ask questions that highlight why people know about some plants and not others (Nolan 1998) and what determines these perceptions. Cultural factors often take precedence over other considerations such as species availability or abundance. The process of choosing and obtaining specific plants or animals speaks to how people view themselves, each other and the environment. Thus, social relationships and perceptions about the environment are enacted in the procurement of wild food resources.

In this paper we explore the relationships among people, the natural environment and the ways individuals preserve and transform their culture and environment. We specifically focus on knowledge of wild or semi-domesticated

plants and animals and practices concerning the use of these resources because they create an intensive interaction with the physical and social environment.

Since consumption usually occurs in the home it has often been assumed that women control the production of consumption as well as the food habits of the family (McIntosh and Zey 1989; Levin 1943). However, non-domesticated/gathered and semi-domesticated food enters the household through a variety of channels. Traditional foods, which still form an important part of the diet, may be procured by the female head of household, husband, male and female relatives, friends, neighbors and children. Within a community, knowledge, patterns of resource use, and the landscape, are affected by gender, class, economic level and personal life experiences. Consequently, theories about the patterns of decisions and actions that occur must take these differences into account. Complex local histories of resource use will do much to increase our understanding of the ways that local systems of resource management transform themselves in response to global processes; in particular they can help us evaluate the ways in which the sustainability of rural production practices are ensured or undermined (Collins 1991). One of the goals of this paper is to describe the variation in knowledge and resource use within a community. We specifically focus on gender; however, since knowledge of the environment is embedded in culture, social and economic factors also are addressed.

DESCRIPTION OF THE STUDY SITE

Physical landscape. —Northeastern Thailand, also called Isan, provides an excellent setting to observe variation in knowledge of the environment and resource use in the context of gender roles and social relationships. Geographically, Isan is set off from other regions by mountains and is characterized by erratic rainfall and poor soils. This gently sloping plateau of undulating hills, terraces and flood plains also includes a zone of hills and upland areas in the west and the south (Hafner 1990) that extract moisture from the southwest monsoon airstreams. Thus, while contributing to the biodiversity of the region, these hills also make the area more susceptible to droughts. Today, the low and erratic rainfall, nutrient poor soils with poor moisture-retention capability, and sparse surface water combine to make the region difficult for wet-rice farming. However, some of the earliest archaeological sites in Asia with evidence of agriculture, pottery and bronze work are located in the Northeast (Higham 1982; Solheim 1968). The semi-arid environment greatly influenced the traditional subsistence system and other adaptations to the habitat.

Cultural landscape. —Nature's impact on culture and personal identity has been great in Isan. Regional identity, which involves a sense of belonging and pride, as well as in-group and out-group categorization, is strong and tied to the landscape and wild resources, especially those that are involved in the cuisine of the region. Traditionally, the people in the Northeast adjusted to variability in these habitat factors through the development of a combined subsistence system, in which they complemented their reliance on the staple glutinous rice and other subsistence



FIGURE 1.—The landscape surrounding the village. Paddy fields (background) and sugar cane cultivation area (foreground).

crops with large inputs from wild food (Moreno-Black 1994; Phongphit and Hewison 1990; Pradipasen et al. 1986; Somnasang et al. 1988; Tontisirin et al. 1986). Isan people have a great deal of traditional knowledge concerning the environment, wild plant and animal resources. They are also knowledgeable about predicting climatic patterns, cropping practices, green manuring, and energy extraction (Rambo 1991).

The rich flora and fauna in the Northeast provide a vast array of edible and useful plants and animals that are gathered for a wide variety of purposes, including food, building material, crafts, medicinal use, and religious purposes. These indigenous practices, and the knowledge that they represent, have been acquired over many generations and are deeply ingrained in regional Thai culture (Phithakpol 1990). The diet, characterized by a staple core of glutinous rice, fish, and fish products, is supplemented by a wide variety of local wild and semi-domesticated plants and animals (Moreno-Black et al. 1996; Moreno-Black 1994; Ngamsomsuke et al. 1987; Ngarmsak 1987; Pradipasen et al. 1986; Somnasang 1996; Somnasang et al. 1998, 1988). These important items—collected from forests, upland fields, rice paddies, gardens, house areas, canals, ponds, swamps, rivers, and dam areas—contribute valuable nutrients. Coupled with a variety of cooking methods, they add diversity to a potentially monotonous diet. Northeastern food has been one regional specialty that has begun to gain popular interest and demand in Bangkok (Van Esterik 1992). In fact, Isan food was characterized and romanticized in popular folk media and has acquired both national and international recognition with the initial publication, gain in popularity, and wide distribution of the novel *Child of the Northeast* (Boonthawee 1976).



FIGURE 2.—A scene from the village showing houses and dirt road.

Life-ways are changing rapidly in Isan and villagers are being affected in terms of economics, social relationships and culture. At the local level, a growing influence of the nationalized central Thai image, an increase in development projects, and a rising monetization of the economy are beginning to influence the regional lifestyle in a variety of ways. Local resources, which used to dominate home use,



FIGURE 3.—A gathering party.



FIGURE 4.—A village woman on her way to gather red ants.

are being used as cash generators. At the same time the abundance of these resources is declining due to national economic and forestry programs that do not emphasize the local species. The local economy has expanded to emphasize cash cropping, wage earning and both temporary and permanent out-migration of adults.

RESEARCH METHOD AND DESIGN

Selection of research village. — The research village was selected from twelve potential villages in the province of Khon Kaen. All of the potential sample villages were chosen using secondary data obtained from the Khon Kaen Policy and Planning Division, The Khon Kaen Governor's office and district-level extension offices. Additional information about the villages was obtained through interviews with government officials at provincial, district, and sub-district government.

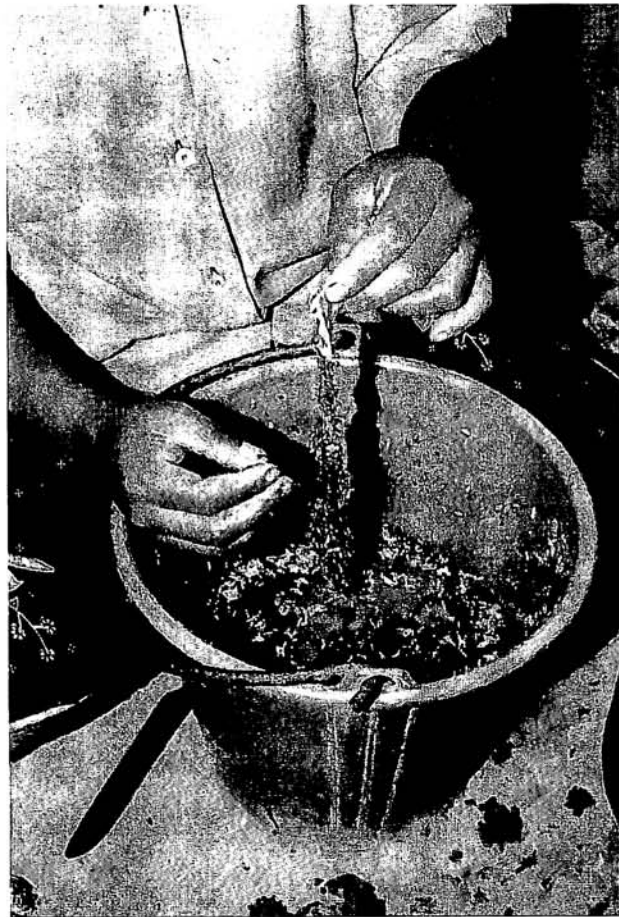
Rapid rural appraisals (RRA) (Chambers 1980; Lovelace, Sukesine and Sugin 1988) were conducted in the twelve villages in the province of Khon Kaen. The headman in each village was interviewed in order to obtain information concerning the general profile of the village, the local environment, occupations of the residents, problems of concern within each village and the use of local wild food resources. Additionally, two or three households in each village were selected on the basis of economic level (poor, middle, rich). Semi-structured interviews (Grandstaff and Grandstaff 1987) were conducted with the individuals from each of these households to acquire information about wild food utilization.

Analysis of the headman interview and villager interview data enabled us to select one village site for an in-depth study. The chosen village was selected be-

cause it represented an average sized village, was characterized by high wild food use, and villagers obtained wild food from three main sources (forest, local water resources and paddy fields). Additionally, the villagers were not heavily involved in selling wild food at the market in the Khon Kaen. Finally, the village was moderately accessible all year round, but was not located on a paved highway.

In-depth village study. — This part of the research involved intensive participant observation and in-depth interviewing in the study village (Figure 1). Our mapping of the village showed that 105 of the 112 houses that were present were occupied. Census information was obtained from all of the 105 households. The census interview included demographic information as well as questions concerning household economics, agricultural practices, wild food use and transplanting activities. The environment surrounding the village was also surveyed in order to record the sites of forest, cropland, and water resources. The study sample households were selected by stratified random sampling based on economic stratification developed in conjunction with the headman. The 64 households in the sample (3 high income, 38 middle income and 23 low income) represent 60% of the total

FIGURE 5.—Separating red ant eggs from red ants.



households in the village. Individuals from these households were interviewed about wild food gathering practices, the types of wild food that are gathered, and how the food items are used. Participant observation, focusing on food procurement, processing and preparation activities, was used to amplify the interview data. The interviews were used to obtain information about gathering practices; knowledge of wild food habitats; the ways wild foods are used; and specific wild food management practices such as transplanting and propagation techniques.

A "Knowledge" test and an "Attitude" test were administered to adults from the study sample and children who attended the one school in a nearby village. Sixty-four adults (32 women and 32 men) and forty-one children (21 girls and 20 boys) were interviewed using a set of laminated photographs of 40 wild food items selected from information obtained during interviews and participant observation (Table 1, Appendix A). The forty food items were divided into four categories: plant (32 items), fish (5 items), insect (2 items) and snail (1 item).

TABLE 1.—Age and gender distribution of "Knowledge and Attitude Test" participants.

| Age | Female | Male |
|--------------|-----------|-----------|
| 10-11 | 21 | 20 |
| 15-25 | 8 | 8 |
| 26-35 | 8 | 8 |
| 36-45 | 8 | 8 |
| 46-55+ | 8 | 8 |
| Total | 53 | 52 |

Mean age of school children = 11 years

Mean age of the adult sample: Males = 37 years; Females = 36 years

Each adult was asked to identify the item (identification test). These data were used in the odds ratio analysis and the scoring system described below was then utilized to compute the I score component of the knowledge test. The knowledge test was composed of several parts and individuals were scored on: ability to identify an item (I score); culinary information, such as how to eat, prepare, and cook the food as well as its taste (C score); non-culinary uses (O score); horticultural practices, such as transplanting, maintaining or propagating the item (TP score); and knowledge of procurement practices (P score). Each person could score up to ten points per item (Table 2) and a total of 400 points for the complete test of 40 items.

For the attitude test individuals were also asked about their attitude toward each item especially in terms of taste qualities and consumption preferences. The children were given the same set of laminated pictures of the wild foods; however, the questions were simpler and shorter since they were only asked to identify each item and express their knowledge of and attitude toward the item.

TABLE 2.—Criteria and scoring system for the Wild Food Knowledge Test.*

| CRITERIA | NUMBER OF POINTS | | |
|------------------------------------|------------------|----------------------|-----------|
| | No Knowledge | Incomplete Knowledge | Knowledge |
| Item Identification (I score) | 0 | 1 | 2 |
| Culinary Knowledge (C score) | 0 | 1 | 2 |
| Procurement Knowledge (P Score) | 0 | 1 | 2 |
| Other Use Knowledge (O score) | 0 | 1 | 2 |
| Horticultural Knowledge (TP Score) | 0 | 1 | 2 |

* No Knowledge = Interviewee lacks any knowledge or answers incorrectly.

Incomplete knowledge = Interviewee either has incomplete knowledge of the item.

Knowledge = Interviewee demonstrates full knowledge in terms of all criteria.

RESULTS AND DISCUSSION

In the Northeast, resources are recognized and perceived as useful within the context of the environmental and social reality of the region. Knowledge of local plants and animals, especially those species that are commonly consumed as food, accumulates over generations and reflects the way people learn from and about their environment. The villagers relied heavily on a variety of non-domesticated plants and animals. A diversity of habitats was utilized, including paddy fields, upland areas, forests, ponds, streams, swamps, rivers, and other water reservoirs. Commonly utilized items include leafy algae, green plants, fruits, mushrooms, amphibians, crustaceans, fish, birds, reptiles, insects and mammals. Wild foods were also used as condiments and often contribute to the distinctive flavor of Isan food. Wild food entered the household in a variety of ways: 1) production through family agricultural activities; 2) procurement through gathering, fishing and hunting by household members; 2) gifts from relatives and neighbors, 3) exchange with other individuals in the village or nearby villages; and 4) purchase. Consequently many individuals can contribute to a household's food consumption and men, women and children all have some involvement with wild food beyond consuming it.

Shared traditions, beliefs and attitudes concerning wild food use.—The majority of people in the village reported eating or using wild food at the present time or in the recent past. The majority of villagers indicated they liked to eat wild food, often preferring wild food to cultivated food and food from the market. Only 3 people (5%) reported they did not like wild food, while only 3 people felt that they like wild food as much as cultivated food. The villagers believe that wild food is necessary and that it is the most important food for everyday life. Analysis of the in-depth interviews revealed that males and females did not differ in their attitude concerning wild food and both men and women preferred to consume wild food over cultivated food.

TABLE 3.—Reasons for preferring wild food over cultivated food (n = 64)

| REASONS FOR PREFERRING WILD FOOD | RESPONSES | | |
|-----------------------------------------------------|-----------|-----------|-----------|
| | Female | Male | Total |
| Taste Factor | | | |
| Taste: delicious, taste better, etc. | 19 | 15 | 34 |
| Higher nutritional value, less fat | 6 | 7 | 13 |
| Fresh, better than market food | 6 | 6 | 12 |
| Natural | 5 | 5 | 10 |
| Total | 36 | 33 | 69 |
| Ease of Procurement and Safety | | | |
| Less poisonous agents, fewer chemical, less harmful | 17 | 17 | 34 |
| Easy to obtain, can gather on their own | 9 | 7 | 16 |
| Cleaner than market food | 6 | 3 | 9 |
| Total | 32 | 27 | 59 |
| Economics | | | |
| No need to buy food, save money | 15 | 14 | 29 |
| Total | 15 | 14 | 29 |

Note: Maximum answers = 3 per person

The villagers gave a variety of reasons why they preferred wild food over cultivated food (Table 3). The most frequent reasons were related to qualities concerning: 1) taste; 2) ease and safety; and 3) economics. The concept of taste is obviously very important and included a number of important components. First, villagers often mentioned the fact that wild food is more delicious and tastes better than cultivated food. They also thought wild food was fresher and tasted more naturally sweet than market food. This is partially because of the inherent qualities of the food as well as the fact that villagers can gather wild food and consume it soon afterwards. Villagers also indicated that wild food was better because it grows naturally, has more nutrient value, especially vitamins and protein, and less fat. These specific nutrition-related characteristics, which some individuals are now ascribing to wild food, are most likely derived from information obtained from government sponsored health and nutrition education programs.

The second group of reasons for preferring wild food revolved around the concept of ease and safety. Villagers preferred wild food because it was easy to obtain or they did not have to spend time or energy cultivating it; it is natural and grows by itself. Villagers consider wild food safe in part because they assume only cultivated food would be contaminated with fertilizers or insecticides. However, it is likely that many of these items, especially those growing in paddy fields and gardens, are contaminated with fertilizers and pesticides. Wild food is also considered to be clean because it comes from the natural environment. It is not mixed with food that can become dirty at the market in town.

The last set of reasons is related to economics. The villagers considered wild food to be good because they did not have to pay money for it, thus they were able to save money by eating wild food. Many villagers felt that poor people needed to

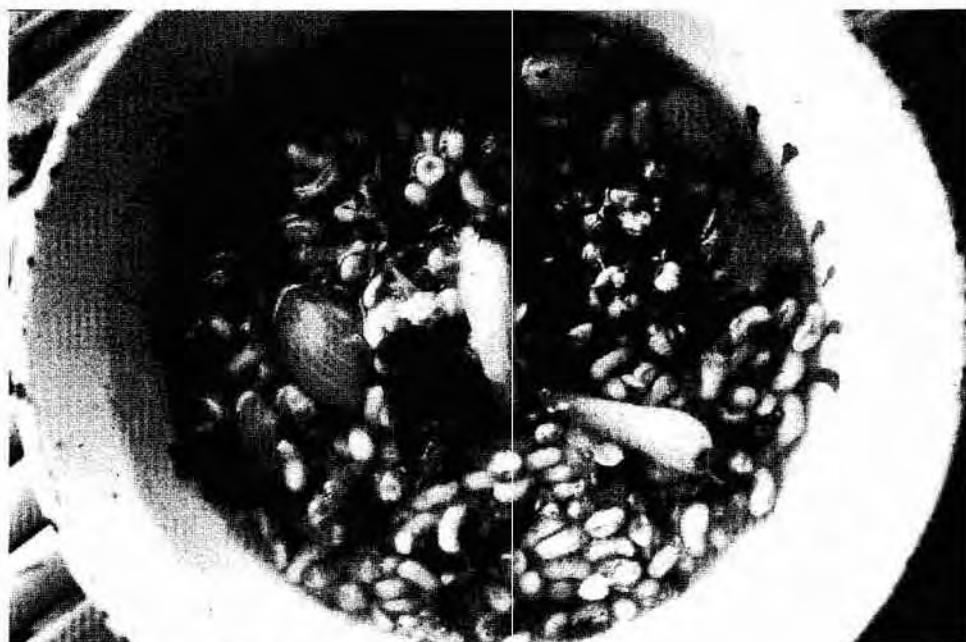


FIGURE 6.—A typical dish made with red ant eggs.

rely on wild food because they do not have much money to spend on food. However, the villagers did not look down on individuals who relied on wild food. Many people also recognized that even rich people utilize wild food as a way to save on spending money for something that is available without monetary cost. Consequently, wild food was not stigmatized as a "food of poverty."

Procurement patterns were affected by time factors. Gathering is as commonly done in conjunction with other activities, such as gardening, agricultural wage labor or tending cattle, as it is done as its own activity. Gathering patterns are to a large extent dependent on both the seasonal availability of the food and seasonal workload of the villagers. In the rainy season two factors impact the amount of time spent gathering. First, because wild food is abundant, less gathering time is required. Secondly, in this season villagers are actively engaged in rice agricultural tasks so they tend to choose to gather food that is close at hand. Similarly for those households that are moving into cash oriented agriculture, such as growing asparagus or cucumbers for the commercial market, the opportunity to gather wild food is limited. Thus, it was not surprising that in the rainy season 53% of the women spent an hour or less gathering. On the other hand, in the cool season, when there are fewer agriculture-related demands, 64% of the women spent one to two hours gathering. In the hot season, however, the scarcity of wild food, more than time constraints from other activities, results in the village women spending more time gathering wild food, and 56% spent two or more hours in gathering activities.

The selection of food is influenced not only by time constraints and preference but also by attitudes about the identity of individuals who are known to consume

the food. Personal identity and food consumption are linked in powerful ways. The villagers in this study expressed a variety of opinions concerning individuals who consume wild food. These associations consciously and unconsciously affect the selection of these foods within the village context. Villagers indicated that they believed that wild food is essential for the poor. They indicated that the poorer people in the village have to depend on wild food, have more experience obtaining it, and are very knowledgeable about how and where to procure wild food. The villagers also expressed the sentiment that the poor also exchange wild food for other food items such as rice. However, villagers with all these opinions also indicated that they did not look down on individuals who gathered wild food; instead, they were considered industrious and hardworking and often a degree of admiration was voiced.

Conflicting beliefs were expressed when others in the village indicated they believed rich people consumed more wild food because they had money to buy it when it was not easy to obtain or when they were too busy to gather it themselves. A few individuals indicated they believed rich people ate more wild food because, unlike the poor people who had to engage in wage labor, wealthy individuals had time to obtain non-domesticated food. In these individuals' minds, the poor people in the village relied on cheap, prepared foods from the village shops. For this group, purchased food was associated with poverty and was considered to be poor quality foods.

When asked how urban people view wild food, the villagers were of the opinion that town people like non-domesticated food and are often eager to purchase these items for ingredients in specific dishes, or as snacks. Villagers believed that wild food has a high market value, sells better than domesticated food and thus brings them a better earnings than domesticated food. A very small number of the interviewees (10 individuals) differed from the general opinion of the rest of the sample by thinking that towns-people had a poor attitude toward wild food, look down on village people who eat wild food or think that wild food, especially insects and some animals are not clean and are disgusting. These villagers also thought that the urban people may look down on villagers who eat this type of food.

Variation in wild food knowledge. —Variation in knowledge of wild food was evident in the study sample, although the majority of villagers stated a preference for wild food and continued to seek out and procure wild food items. The knowledge test was used to measure recognition, culinary knowledge, consumption, procurement, other uses, and transplanting and horticultural techniques (Table 2).

An odds ratio (Agresti 1990) which interprets differences between two population proportions or possibilities, was employed to estimate how frequently one population identified a wild food correctly compared to the other (Identification test). We first compared men and women and then compared adults and children in terms of their ability to identify items in the wild food test (Table 4). In this analysis we grouped items into categories (plants, fish, and insects). The odds ratio analysis showed that, compared to men, women were more likely to be able to identify plants (1.38 times), insects (1.38 times) and fish (1.07 times).

TABLE 4.—Gender based comparison of likelihood of correct identification of wild food.

| Gender | Female | | Male | | Odd's Ratio |
|-------------------------|------------|-------------|------------|-------------|--------------|
| | I | N | I | N | |
| Adult | | | | | |
| Plant Group | 626 | 1006 | 552 | 1014 | 1.38* |
| Fish Group | 59 | 129 | 64 | 145 | 1.07 |
| Insect Group | 45 | 63 | 40 | 62 | 1.38* |
| <i>Total Wild Foods</i> | <i>730</i> | <i>1230</i> | <i>656</i> | <i>1253</i> | <i>1.34*</i> |
| Children | | | | | |
| Plant Group | 175 | 326 | 155 | 312 | 1.17* |
| Fish Group | 34 | 76 | 42 | 73 | 0.60 |
| Insect Group | 16 | 29 | 13 | 32 | 1.80* |
| <i>Total Wild Foods</i> | <i>225</i> | <i>445</i> | <i>210</i> | <i>429</i> | <i>1.07</i> |

Note: I = Total correct identifications

N = Number of valid samples

* = significant difference at $p \leq .05$

Among children, girls were more likely to identify wild plant species correctly (1.17 times), and insects correctly (1.80 times), than boys. However, girls recognized fish less often (0.60 times). When the children and the adults were compared concerning their ability to identify the wild items, the odds ratio showed that adults were 1.31 times more likely to identify plants and 2.35 times more likely to correctly identify insects. But the adults were less likely to identify fish correctly (odds ratio = 0.78) (Table 5). A total of 25 plants were used in the "attitude and knowledge" test. Eleven plants were correctly named by 80% of the children, but there were 16 plants that 20% or fewer of the children could name. However, a very large majority of the students (78%) said they consumed between 13 and 15 of these plants, and they also indicated they liked wild foods.

In general, adult women and girls out-performed their male counterparts in identification of wild food items. Girls were 1.07 times more likely to identify the total three groups of wild food than boys, and adult women were 1.34 times more likely to identify all three groups correctly than the men (Table 4).

TABLE 5.—Age based comparison of likelihood of correct identification of wild food ("identification" test).

| Wild Food Type | Adult (N=64) | | Children (N=41) | | Odd's ratio |
|-------------------------|--------------|-------------|-----------------|------------|-------------|
| | I | N | I | N | |
| Plant group | 1178 | 2020 | 330 | 638 | 1.31* |
| Fish group | 123 | 274 | 76 | 149 | 0.78 |
| Insect group | 85 | 125 | 29 | 61 | 2.35* |
| Total Wild Foods | 1386 | 2419 | 435 | 848 | |

Note: I = Total correct identifications

N = Number of valid samples

* = significant difference at $p \leq .05$

The wild food knowledge test was also used to compare knowledge of wild food by comparing mean scores on the components of the knowledge test: identification (I score), culinary knowledge (C score), procurement methods (P score), other uses (O score), transplanting and horticultural information (TP score) and total score (S score) (Table 2). The mean scores of each food group were calculated and compared between males and females and among the age groups using an analysis of covariance. The analysis of covariance showed that there was no significant difference between gender in the I, C, P, O TP and S scores. Although women tended to have higher scores in each component, the differences were not statistically significant. However, there were significant differences between the age groups for both males and females for all five categories of the knowledge score: I ($p = .001$), C ($p = .009$), P ($p = .004$), O ($p = .001$) TP ($p = .001$), and S ($p = .001$). Thus, it is clear that the older individuals have more knowledge about plants than the young. However, the age factor was not significant in terms of knowledge of insects or fish.

Retention and loss of knowledge about local nondomesticated resources is an issue of importance to researchers who are concerned with maintaining biodiversity, cultural diversity, and ethnobiological knowledge, and those interested in understanding how culture is expressed and rendered meaningful. An examination of our data shows that gender and age are factors related to differences within this community in terms of knowledge of wild food. This finding is similar to research done by Wester and Yongvanit (1995). When they compared individuals from different villages and levels of education in Isan, they also found that in almost all age groups women scored slightly higher than men on a test of wild plant knowledge. In their sample of 795 males and females (10 - 99 years of age), they also found that there was a general tendency for scores to increase with subject age until about 70 years, when scores of men showed a sharp decline. They further found, in marked contrast to scores of village populations, students, all of whom were younger than 30 years old, scored low. However, Ogle (1984) in her research in Swaziland, found that children recognized a large number of different wild species and reported high consumption of the items. Consequently, she concluded knowledge was not being lost to the extent feared.

Differences in knowledge, both within and between communities and groups of individuals is to be expected, since men and women utilize and define the environment differently. The division of labor that occurs in agricultural communities leads to differentiation in work patterns, contact with resource areas and procurement of resources themselves. That children can have less familiarity or knowledge than elders is also not surprising since they have had less time to accumulate information, fewer life experiences, and are often not as involved as adults are in resource utilization. Additionally, as adults are pulled into wage earning activities outside the village, opportunities for communication of information also decrease or vanish completely.

Differences in knowledge should not be accepted or dismissed lightly since the loss of traditional knowledge among many subsistence-oriented communities in many parts of the developing world has been noted. For example, Anderson (1993) has expressed concern about the perpetuation of such information among

the hill tribes of northern Thailand and Works (1990) recorded that elders in a Peruvian community frequently lament that younger individuals are no longer interested in plants or gardens. Similarly, Maikhuri and Gangwar (1993) observed that knowledge of plants in younger individuals in the Khasi and Garo tribes of Northeastern India was judged to be poor. Similarly, the older villagers in our study often expressed concern about their perceptions of the loss of knowledge among the younger generation. Elders complained about their children and grandchildren not being interested in learning about the procurement and preparation of wild food.

CONCLUSIONS

Loss of traditional knowledge among agricultural communities as they experience the effects of globalization has been noted in many parts of the world. Nonetheless, many individuals remain connected to local practices, at least to some degree. In Isan, the strong connection between ethnic identity and cuisine encourages the preservation of local resources that imbue their taste, texture and odor to Isan cuisine. Many of these items are wild plants and animals. Additionally, many of the plant food items are also integrated into the local belief system regarding health and serve as medicinal plants. The continued reliance on important wild resources has led to items being utilized by different people at different times. Consequently the distinct interests that different segments of society have in the rural productive environment influence resource use and preservation (Collins 1991). However, as suggested by Wester and Yongvanit (1995), the decrease or loss of traditional practices and knowledge appears to be not always a conscious choice. It is sometimes an incidental result of new patterns of living.

Adults are increasingly participating in the new economic patterns, which, rather than being embedded in the mixed subsistence practices, more and more involve cash cropping of introduced and domesticated crops as well as working for wages and both temporary and permanent out-migration. Children and young adults are also affected. Young adults are increasingly attracted to the trappings of the urban, cosmopolitan culture. Children who attend school, especially the higher grades outside the village, are occupied with studies that keep them from participating in subsistence activities to the extent that children did in the past. It also exposes them to different ideas and activities. In the study reported here, the connection between land and life that was deeply embedded in daily survival in the past appears to be in the process of being altered as a result of the adoption of urban values and goals. Individuals are also absent from the locale during the periods of their life when they would have been participating in activities that necessitated the accumulation of local knowledge about the environment and wild food resources. Although they still enjoy and prefer the tastes that these wild food items give to local dishes, and indeed connect them to local ethnic identity, they are not as knowledgeable about them as the elders are.

The information obtained in this study highlights the fact that there are vital connections between gender and age (and thus work patterns, division of labor, and participation in the wider national and global processes) and knowledge of

local resources. Women were 1.34 times more likely than men to identify plants, insects, and fish correctly. The knowledge scores showed that women have greater knowledge than men in terms of recognition, gathering knowledge, preparation and consumption knowledge, and uses of wild food. However, the scores from the total knowledge test indicate that there were no significant gender differences. There were significant differences in plant knowledge among the different ages, with the older individuals scoring higher than young adults and children. These differences, which may be indicators of erosion in the local knowledge base, are potentially being exacerbated by both temporary and permanent out-migration, which results in fewer opportunities to learn about their native environment and the resources that are utilized.

It is clear that factors such as gender roles, division of labor and the economic and social impact of nationalization and globalization determine the breadth and depth of knowledge about the habitat and local indigenous resources. These factors are probably more important than resource abundance and diversity in the contemporary conditions of rapid economic and cultural change. The fact that wild food knowledge is largely a construct of such factors has important implications for the survival of both knowledge about these resources, and ultimately the resources themselves. Villagers in the study are aware and concerned about the potential loss of knowledge. They frequently expressed a desire to preserve wild food for the younger generations. They mentioned that some types of wild food were rare, and they feared their children or grandchildren would not get to enjoy them. Villagers often proposed ideas to enhance retention, such as transplanting species, decreasing the amount of wild food gathered for sale, working with officials to develop programs, willingness to comply with laws that would protect native species and habitats, and seeking to develop educational programs directly targeted at children.

Our findings indicate that younger individuals have less knowledge than the elders in the village. It is important, especially from the perspective of the villagers, that local knowledge about wild plants and animals be maintained and documented. We believe government policymakers and development workers should consider ways to integrate local knowledge into the formal education system and incorporate it into relevant projects whenever possible. Efforts should be made to work with village elders to develop resource material such as illustrated pamphlets or monographs about local wild food resources for schools and public libraries.

We also believe that villagers, forestry experts, and government officials could work together to determine ways to preserve indigenous species while still enabling villagers to utilize these resources. Additionally, villagers should be encouraged to develop management strategies that will limit harvesting practices that are currently straining local resources. At the same time, it is vital that the concept of sharing be maintained, so that villagers can procure and consume wild food together, thus enjoying both the social and nutritional benefits that characterize Isan cuisine and culture.

Our study indicates that it is very important to begin obtaining dynamic accounts that relate women's and men's activities to the process of ecological change

and the continuity of local traditions and knowledge. The preservation of knowledge about wild food plants appears to be the result of the continued connection with the local geography, and personal identification with the village or region. This is linked to specific food items or taste qualities, economic pressure, and intrinsic family interest and motivation to preserve traditional patterns. In particular it is important that we recognize the ways in which different interests in the environment are structured by gender, age, class, caste, or ethnicity in order to identify individuals who are knowledgeable about local habitats and resources. Identification of important cultural influences in the construction of local knowledge will be invaluable for the design and application of conservation programs.

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APPENDIX A.—Wild food items used in the Knowledge and Attitude Test*

| Botanical name | Local name |
|---------------------------------|----------------------------|
| Plants | |
| <i>Amaranthus gangeticus</i> | phak kaenkhom |
| <i>Amorphophallus</i> spp. | erok |
| <i>Antidesma acidum</i> | mark mao |
| <i>Butomopsis latifolia</i> | pinoy |
| <i>Calamus</i> spp. | whai (rattan) |
| <i>Capparis tennera</i> | mark muay (fruit) |
| <i>Cassia siamea</i> | keeleak |
| <i>Centella asiatica</i> | phak nork |
| <i>Cratoxylon formosum</i> | phak teaw |
| <i>Curcuma parviflora</i> | dork grajeaw (flower) |
| <i>Cyclea peltata</i> | kruamanoi |
| <i>Dioscorea alanta</i> | mon liam (tuber) |
| <i>Dioscorea hispida</i> | kloy (tuber) |
| <i>Emilia sonchifolia</i> | phak linpi |
| <i>Garcinia cowa</i> | somong |
| <i>Hydrocharis morsus-ranae</i> | yopae |
| <i>Irvingia malayana</i> | bak bok (fruit) |
| <i>Limnoccharis flava</i> | phak kanjong |
| <i>Limnophila aromatica</i> | phak kayang |
| <i>Marsilea crenata</i> | phak waen |
| <i>Monochoria vaginalis</i> | ehin |
| <i>Ottelia alismoides</i> | obab |
| <i>Oroxylum indicum</i> | linfa (pod) |
| <i>Polygonum odoratum</i> | phak paew |
| <i>Sauropus androgynous</i> | kantong |
| <i>Solanum trilobatum</i> | mark kheng |
| <i>Stephania brevipes</i> | huabua |
| <i>Thyrsostachys siamensis</i> | normai huak (bamboo shoot) |
| <i>Wolffia globosa</i> | kipum |
| — | mark pipuan |
| — | liumpua |
| Fungi | |
| <i>Careya sphaerica</i> | hed phungtam |
| Fresh water fish | |
| <i>Cirrhinus jullieni</i> | pla khona |
| <i>Cirrhina microlepis</i> | pla suit |
| <i>Cultrops siamensis</i> | pla pap |
| <i>Solidago polyglossa</i> | pla khao huangleang |
| <i>Tilapia</i> | pla kha |
| Snail | |
| — | hoi sai |
| Insects | |
| <i>Brachytrupes portentosus</i> | ji law |
| — | maeng huakuai |

*Plant identification was determined by consultation with Dr. Sompong Thamathawan and Dr. Samang Homchoen at Khon Kaen University.