

## Writing the Histories of Indigenous Agriculture in Southeast Asia.

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### Introduction

The need for this review is obvious, for the historiography of agriculture, like its history, has been sorely neglected. The fairly-recent collection of essays published as *New terrains in Southeast Asia history*, (1) for instance, makes only passing mentions of the subject. A necessary preliminary to this introduction to the historiography of agriculture in the region is to define terms. Obviously there are many kinds of histories of agriculture; those linking trade, politics or economics with agriculture, histories of agricultural technology in general or particular, histories at all scales from the region as a whole to single villages or social groups.

By 'indigenous' is meant those forms of agriculture that have been so long established that this term can be legitimately applied to them. Such are far more than simply 'subsistence', a term that begs a further set of questions, not to be addressed here. 'Indigenous' clearly excludes those forms of agriculture involving high levels of capitalization linked with export orientation of non-food commodities, though it may include those with some degree of centralized management. Such were the rice-producing systems of *metayage* that developed in colonial-era Cochinchina (2) and in Province Wellesley, Peninsular Malaysia, (3) or in the slave-based religious foundations of early Cambodia (4). Even if partly market-oriented, indigenous agriculture includes a significant subsistence component. Its methods are those of long standing traditions rather those of modern agricultural science though clearly in more recent times, some modern aspects may be included, such as large-scale irrigation from stored water, written titles to land or the use of fertilizers. Indigenous agriculture is also economically part of an over-arching and at the family level, an integrated system of obtaining the necessities of life from cultivation, the rearing of animals and from foraging, some of the last in the fields. (It may be argued, with some justification, that conceptually extracting agriculture from such a system fatally damages what in reality and in the eyes of its practitioners is a single entity).

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The European distinction between agriculture and horticulture is demonstrably inapplicable in Southeast Asia for the scale of operations has long been very different. Equally, the concept 'agriculture' subsumes the rearing of livestock, whether these are farmyard animals such as pigs, ducks and chickens (and in some societies, dogs) for food or large animals such as cattle, buffaloes, sheep and goats. The specialized rearing of herds of bovines may also be considered as part of the traditional economies, not least because of the earlier, and in some remote areas, the still-surviving importance of these animals for transportation, especially in continental Southeast Asia. The concept also includes 'kitchen-garden' production of vegetables, spices, flavourings and dyestuffs.

Historically, agricultural Southeast Asia extends well beyond the region's present political boundaries. In the northeast, the agriculture of the aboriginal peoples of Hainan, Taiwan and the Ryukyus, like their languages and culture in general, have clear Southeast Asian affinities. In eastern Nusantara there is a transition zone from rice-based agriculture, itself probably a fairly-recent phenomenon, through sago-based cropping and collecting to rather different 'Papuan' or more generally Melanesian systems based upon tubers, in relatively recent times including the American sweet potato *Ipomoea batatas*. In the west, Southeast Asian agriculture extended to the islands off Sumatra, but not to the island chains of the Andamans and the Nicobars for until quite recently these lacked any form of cultivation as some areas still do. In the northwest, the agriculture of the peoples of the uplands of Arakan, the Hill Tracts of Bangladesh, of Tripura, Mizoram, Manipur and, especially, Nagaland in India have strong Southeast Asian affinities as many writers, notably Christoph von Fürer-Haimendorf, have emphasized(5). To the north lies a great three-way transition zone. At lower and intermediate elevations in this tangle of high mountains and deep valleys, people such as the Yao, Miao and a host of others occupy the borderlands with China, over the last several centuries with Han Chinese settlements intercalated amongst them. At higher elevations, in northern Burma and the Chinese provinces of Yunnan, Sichuan and Guizhou, the uplands are occupied by peoples of Tibetan cultural affinities with very different crop and animal assemblages.

### **Some major works reviewed**

Though most Southeast Asians are but a generation or two removed from being agriculturalists, it is ironical that historians of the region have thus far rather neglected the histories of farming in the region as a whole. In this regard agriculture is no different from much else (6). To be sure, there is a reasonably long list of books that cover various countries. This includes Michael Adas's, *The Burma delta* (7), Yoneo Ishii's edited volume *Thailand, a rice-growing society* (8), Yoshikazu Takaya's study of the Chao Phraya delta, *Agricultural development of a tropical delta* (9), R.D.Hill's *Rice in Malaya* (10) and Robert Elson's *Javanese peasants and the colonial sugar industry* (11). For Indochina, Pham Cao Duong's *Vietnamese peasants under French domination* (12) is noteworthy, as is Jean Delvert's *Le paysan cambodgien* of 1961, fortunately reprinted in 1994 (13) the latter geographical in approach. With the effluxion of time, it is, like Pierre Gourou's equally geographical *Paysans du delta tonkinois* published in 1936 in French

and later in English translation (14), now a valuable historical source. Michael Vickery's superbly documented *Society, economics and politics in pre-Angkor Cambodia* (15) certainly contains much of interest to the agricultural historian, but is more broadly focused, as the title suggests.

Two further major works on agriculture are partly theoretical but have significant Southeast Asian content. Carl Sauer's *Agricultural origins and dispersals* of 1952 (16) outlines in lecture form the globe's major centres of plant and animal domestication. Unfortunately, the nature of this stimulating work precluded the provision of any documentation. The second is Clifford Geertz's much-debated *Agricultural involution* published in 1966 (17). This was based substantially upon his sociological investigations in a small part of Java but then generalized far beyond that region to Indonesia, indeed to Southeast Asia as a whole. In addition, Peter Bellwood's recent *First farmers, the origins of agricultural societies* contains an excellent summary of early agriculture, interpreted from a strongly diffusionist standpoint (18).

Agricultural histories covering the Southeast Asian region as a whole are singularly scarce, doubtless in part reflecting the limited linguistic skills of researchers. Noteworthy is Robert Elson's challenging book *The end of the peasantry in Southeast Asia* (19). But that deals mainly with the post-colonial transformation of the region's agriculture and fails to deal as fully as may be desirable with the still substantial continuation of subsistence production in parts of the region, in Viet Nam, parts of Laos, West Papua and many other remote areas. The focus on particular parts of the region remains substantial, as is shown in the recent volume edited by Peter Boomgaard and David Henley, *Smallholders and stockbreeders* (20). Most of the contributors examine single countries or regions within them. Only the editors in their introduction and the opening chapter by Hill cover the region as a whole.

By contrast, a number of prehistorians and ethnobotanists have cast their net wider, perhaps because artifacts may be easier to interpret than documents in sometimes obscure languages, though problems remain in the interpretation of botanical evidence. Karl Hutterer's papers on the natural and cultural history of Southeast Asian agriculture and the ecology and evolution of agriculture in Southeast Asia are noteworthy, wide-ranging studies that bring to bear a variety of lines of evidence (21). They are, however, necessarily brief. Wilhelm (Bill) Solheim has produced a number of valuable overviews and is a strong proponent of 'local genius' in the evolution of agriculture (22). Peter Bellwood at the Australian National University and Charles Higham at the University of Otago take more unilinear approaches in their interpretations of archaeological finds (23). These authors are, or have been, very active excavators, which adds authority to their work.

Among the historically-minded ethnobotanists, Jacques Barrau and Douglas Yen are notable, though for both their primary focus has been upon Oceania rather Southeast Asia (24). Given that agriculture in the former is in part derived from the latter, the two regions are intimately linked. Barrau's edited collection of papers, with Bernot, Chiva and Condominas, *Agriculture et sociétés en Asie du Sud-est* (25) is a masterly summary,

alas never translated into English. Among geographers, few have followed Carl Sauer's lead though Hill has written on the origins of domesticated rice, in a paper that has been largely ignored (26).

### **Major gaps in regional writing**

As has been shown already, there is a major gap in writing about the whole region from early historic times through the colonial era and it was suggested that this may be explained in part by the limited linguistic skills for researchers. These should not be underestimated. For the pre-colonial high civilizations, Sanscrit, Old Khmer, Old Javanese, Vietnamese in Chinese characters and a number of other extinct tongues require mastery though there is an increasing body of translations available. Jan Wisseman Christie's work on Indonesia is particularly noteworthy here (27).

For the colonial period, at the very least, the historian who would cover the major part of the region needs English, French and Dutch, with Spanish for the Philippines before the end of the nineteenth century. For the earlier period of contact, Portuguese is essential though this writer's experience is that published sources in that language offer slim pickings indeed. Spanish-language offerings are a little better but here the researcher has the major advantage of a steady stream of work on the Philippines being translated, with varying degrees of skill, into English. At this point, it may be apropos to enter a word of warning. Many of the translators, and not just of Philippine sources in Spanish, are essentially linguists, and translations may contain significant errors because of lack of familiarity with agriculture. For example, Father Alcina's major work, *La historia de las islas et indios de Bisayas* of 1668, published in 2002 in Spanish with a parallel English translation, definitely needs a gloss to cover agricultural and forestry terms the writer used but which have been mistranslated (28). Part of the problem is that early authors often used non-standard terms, many being variants of indigenous terms, and these are not to be found in dictionaries.

For both pre-colonial and early colonial times, there is also a steady stream of materials translated from various vernaculars. Some are records of inscriptions such as the monumental *Inscriptions du Cambodge* by George Coedès, published in eight volumes beginning in 1937. This followed earlier reports on Siam and Srivijaya, by the same scholar (29). Indeed, it may be said with some confidence that virtually all of the known inscriptions have been translated into one or other western language. Some are being translated again, many into English where such translations have not previously existed. Much of the early material published by the *Ecole française d'Extrême Orient*, for example, is now being re-evaluated and also translated into English. But most of this considerable corpus contains rather little of interest to the agricultural historian. A partial exception is the Khmer material, substantially used by Michael Vickery (30).

Amongst the component parts of the region, the Philippines and the former French Indochina stand out as areas about which much remains to be studied. For the former there is not a single major work though Norman Owen's detailed studies of Bicol provide

valuable insights to a component part, an area substantially oriented towards the production of *abaca* fibre (31). There is no overview of agriculture and land colonization in Mindanao, which was transformed from the early twentieth century. There is rather little on the Visayas outside the sugar haciendas and much remains to be done in Luzon, notwithstanding Marshall McLennan's work on Nueva Ecija (32) and W.H. Scott's many studies on the Cordillera, most collected in his book *On the Cordillera*, as well as his other studies, notably of the Visayas (33). Pre-colonial agriculture, in particular, remains largely darkness, illuminated here and there by the work of archaeologists. For Indochina, early Cambodia and to a degree colonial Cochinchina are covered but for the rest little is known, especially for Laos, though, as will be pointed out later, there is abundant material available, sometimes for quite remote areas.

The borderlands of China and India have been sorely neglected. For the former there are limited sources, some translated from Chinese, before the early twentieth century. Most fall into the category of curiosae. Some examples are works by Playfair, by Clarke and by Berthold Laufer (34). For the Indian borderlands, sources in English begin in the nineteenth century but have scarcely been used. The same is true of sources concerning the aboriginal areas of Hainan, Taiwan and the Ryukyus. Examples include a number of anonymously authored papers on Assam, Calder's notes on Hainan, an account of travels in Formosa in the 1870s and M'Leod's early account of the Ryukyus (35).

### **Major gaps in topical writing**

An alternative approach to agricultural history is via specific topics rather than agriculture as a whole. Here the lacunae are very large. While there is abundant material, researchers have been remarkably slow to tackle the history of agricultural technology either as a whole or in its component parts. One exception is the spread of crop plants. To the present, this has mainly been the preserve of historically-minded botanists. Former director of the Singapore Botanic Gardens, Isaac Henry Burkill long ago compiled his magisterial *Dictionary of the economic products of the Malay Peninsula*. This contains a great deal of historical information, though much is now dated, for his research on the subject began in the 1910s. Despite its title, this work actually covers much of the region, including mainland Southeast Asia (36). J.W. Purseglove's volumes on tropical crops contain much of relevance to the spread of crops in Southeast Asia (37). Particularly valuable are Smartt and Simmons, *Evolution of crop plants* and for the spread of American plants, R.M. Zingg's rather obscurely-published study on the Philippines (38). If some points of criticism may be entered here, they would focus on the fact that in many botanical works, close documentation is often lacking. It may also be suspected that there has been a good deal of uncritical borrowing of information amongst their writers.

But many other topics have been almost entirely neglected, especially at the region-wide scale. For instance, it is well known, but not well documented, that in the 1960s, over much of insular Southeast Asia, the sickle began to replace the traditional small harvesting knife, Malay *aniani*, a process that probably began much earlier in mainland Southeast Asia, in parts of which it is possible that the small knife has never been used.

Irrigated terracing, now for rice, is a spectacular feature of a number of upland areas; in Viet Nam, along some of the borderlands with China, in Luzon the regions occupied by the so-called Igorots, and many densely populated parts of Java and Bali. The question of whether these terraces may have started out as the home of taro cultivation, as suggested by Jacques Barrau, the French botanist, remains unresearched (39). The issue of whether they are a response by spatially-circumscribed peoples with growing populations also remains unaddressed.

The question of whether Southeast Asian peoples ever built permanent water-storage structures for agriculture has only been partly considered, mainly in the context of Angkor Wat, where an emerging consensus indicates that the famous *barays* did not serve as irrigation reservoirs. For one thing, they lack the necessary control structures such as characterize the tanks of ancient Sri Lanka. Elizabeth Moore presents a revision of the older school of thought represented by scholars of the *Ecole française d'Extrême Orient* (40). Single-season water diversion structures with a very limited storage capacity certainly existed but in most parts of the region, probably all, substantial, permanent storage had to await the arrival of colonial-era reinforced concrete. D.E. Short and John Overton deal with the evolution of irrigation in the Malay Peninsula (41).

Current-driven waterwheels (*noria*) lifting water for irrigation were, and in remoter locations remain a feature of the landscape in a number of disparate parts of the region. They existed among some non-Han peoples of southwest China (and amongst Han), amongst the Vietnamese, of Quang Tri province especially, the Khmer, the northern Thai and the Minangkabau of north-central Sumatra and the Negeri Sembilan of the Malay Peninsula. How such an extraordinarily disjunct distribution may have evolved is a complete mystery.

Another field that remains to be investigated thoroughly is that of intensification, especially of rice cultivation. This is often envisaged as proceeding from early or 'primitive' shifting cultivation, through a single annual rain-fed crop, at first sown broadcast, later transplanted, to double and then multiple cropping. This schema begs many questions. First, it should be recalled that domesticated rice *Oryza sativa*, is a hybrid, one of whose ancestors was the wild perennial, *O. perennis*. This fact alone would suggest that early cultivation did not necessarily involve annual cultivation, for this is hard work and can easily be avoided for a year or two subsequent to initial planting by allowing the ratoon crop to emerge, albeit with a usually-modest yield penalty. Second, it cannot be that the shifting cultivation of rice on hill slopes was the earliest form of cultivation, for rice is physiologically a swamp plant, as well as being a perennial, facts not always recognized, even by botanists (42). If the International Rice Research Institute's so far rather limited success in breeding high-yielding upland varieties is any criterion, much time must have been required for farmers to select varieties that would grow where standing water was absent.

Another aspect of the intensification of rice cultivation is transplanting. This is highly advantageous in terms of yields, for the practice greatly reduces competition from

adventitious plants early in the growth of the rice. The price of this yield enhancement is a greatly increased labour input in the preparation of nurseries, either wet or dry, and in the transfer of the seedlings to their final destination in the fields. By contrast, broadcast sowing of seeds directly into the prepared soil reduces the labour input, as many Southeast Asian growers are beginning to discover for themselves in the face of rising labour costs. In some parts of the region, broadcast sowing into ploughed but unbunded flat or gently-rolling fields survived into the 20<sup>th</sup> century. D.H. Grist and Syed Abdul Rahman covered this topic in detail for the Malay Peninsula as long ago as 1921 (43), but the system must have long existed elsewhere, in Java and Bali, for example, where *padi gogo* is grown in this manner to the present. As with other forms of intensification, it is tempting to see population growth as a driver for increased labour inputs and consequential increases in yield, because rice above most other crops, is very responsive to such increases in inputs. But the question needs much closer attention than it has thus far received.

In recent times, disintensification of agriculture has begun but it too has received limited documentation. In parts of Peninsular Malaysia, for example, transplanted rice has been replaced by broadcast sowing with a substantial saving of labour though with some reduction in yield. Tree crops may give much higher economic returns for lower inputs of labour than rice. It is clear that this process began some decades ago in some urban fringe areas but it remains substantially undocumented.

The issue of the double cropping of rice is another aspect of intensification that has been less than thoroughly investigated historically. Traditional varieties are photoperiod sensitive and most require 180-220 days to mature, leaving little or no time for another crop within a wet season. Dry-season cultivation virtually everywhere requires the application of water. Much has been made of so-called 'Champa' rice, one or more early short-term varieties (44). But the yield penalty compared with long-term rices was probably considerable. Those 90-day varieties seen in the field in Peninsular Malaysia in the 1960s, termed *padi ringan*, certainly yielded less than the long-term *padi berat*. The use of short-term varieties in earlier times was probably as a stop-gap when the rains were late or they were used only where land with limited inundation had to be cultivated, on alluvial terraces for example. In the land-rich situation that existed in most of Southeast Asia until late in the colonial era, it defies economic logic to suggest that double cropping was a subsistence imperative. Where weak polities had problems in controlling their oecumene, however, it must be conceded that there could have been a real need to intensify production on such lands as could be secured and protected. Obviously there is much here that requires documentation.

In the region generally, it is clear that crop assemblages are and have been far from autochthonous in origin. R.D. Hill's recent paper (45) is the merest sketch and much remains to be described especially for crops that entered the region in pre-colonial times, such as pepper. Crops of American origin such as sweet potato, maize, manioc (cassava), tobacco, chilli, pineapple, guava and many others arrived in Southeast Asia both direct via the galleon trade between Manila and Acapulco, Mexico, and indirectly through the agency of the Portuguese in South Asia. But when and how each spread in the region is

largely a mystery, dispelled only in part by R.M. Zingg for the Philippines (46). Burkill's *Dictionary* is a good starting point, especially because his documentation, though dated, is excellent (47). However, this work remains unknown to many historians.

It is suspected that missionaries may have played some part in the process of spread. Early introductions are not well documented though comprehensive searches have yet to be made. It would not be at all surprising to find mentions in early Dutch, Spanish and Portuguese documents. In later colonial times, European crops such as the so-called 'Irish' (actually American) potato were introduced by homesick colonials in a number of places. District officers in the borderlands of India and Burma certainly introduced a number, as did Protestant missionaries in Palawan. Especially notable here was the work of the Botanic Garden at Buitenzorg, now Bogor, in the uplands of Java, near Batavia (Jakarta). French colonial officers in Indochina probably played a significant role in the process of crop introduction as occasional tantalizing mentions in the colonial literature indicate.

While crop assemblages have unquestionably been added to by the 'Americans', it equally it seems likely that crops have dropped out of the usual repertoire. The tuber *Pueraria* is one. Works by Groeneveldt and by Watson are relevant here (48). If Carl Sauer and Jacques Barrau are correct, tubers such as yam and taro were once the basic starch foods in the region, displaced by rice at very varying rates, for some peoples grew tubers (or millets) into recent historical times. Clearly, this was a major change. Those who enjoy foods flavoured with vitamin C-rich chilli might argue that this too represents a major change, in cuisine if not in crop repertoire.

Amongst domestic animals, it seems likely that dog-raising for food continues to drop out of domestic activities though it survives in the Philippines, Viet Nam and the borderlands of Southwest China. Certainly, a major change that likely accompanied the spread of Islam was the dropping of domestic pig rearing and dog rearing, for consumption of the flesh of both animals is forbidden to the Faithful. These changes too, remain substantially unresearched.

Amongst large animals as well, there remain many mysteries. Just where and how the buffalo was domesticated is still uncertain though Southeast Asia is a strong candidate for it has wild species of *Bos bubalus*. Its spread remains undocumented but clearly was uneven. Sarawak, for example, seems not to have had the animal until late colonial times, Beccari in the 1860s noting the absence of the traction plough (49). Cattle too were by no means universal in early times though as with the buffalo, there is every possibility that there is an ancient indigenous domesticated type in the region. The Zebu strain, marked by a fatty hump on the neck, especially pronounced in males, is doubtless an introduction from South Asia but details of this are unknown. Later, in colonial times, other strains were brought in, mainly by governments, though no one has yet written an overview from the reasonably large published literature, let alone used archival sources. In this context, it should be noted that equally there has been almost nothing written on the causes and effects of the many epidemics that afflicted domestic animals. Notable are rinderpest and foot-and-mouth disease. Their economic significance was very considerable for the



number of deaths was often substantial and the loss of animals for traction quite devastating to the agricultural economy. Hill's *Rice in Malaya* contains only brief mentions (50).

The rearing of animals in herds is often seen as a rarity in the region. To be sure, this is the case in many lowland areas at present. But in the past even such now densely-populated plains as the Chao Phraya and earlier the Red River delta were by no means fully occupied so that there was plenty of space for herds. In addition, the demand for animals was much greater than nowadays. The displacement of buffaloes as plough traction by hand tractors, 'iron buffaloes', is, of course a matter of the last three decades at the most, though rather poorly documented. But, especially in continental Southeast Asia where long distance overland transportation systems sprang into being every dry season, both buffaloes and cattle were widely employed as traction animals for carts. The Korat Plateau, for example, was crisscrossed by a network of routes centred upon Korat town (Nakhon Ratchasima). Cattle were also extensively used as pack animals, a practice that survives in the still roadless uplands of southwestern China and the adjoining borderlands.

Many sources describe the rearing of both kinds of cattle in herds, a practice that survives in upland areas in central Viet Nam, in Sabah and upland Luzon where fires are often annually set to promote the growth of new grass in what are naturally rather tough and indigestible grasslands. The roles of large animals have clearly changed since the nineteenth century but details are so far lacking, except as documented in some of the contributions to *Smallholders and stockbreeders* (51).

Before the twentieth century, modern medicine had scarcely penetrated the Southeast Asian countryside. In most villages, herb gardens existed. From these both lay persons and indigenous medical practitioners drew remedies of very varying efficacy (52). Such gardens also commonly contained plants for dyes, a practice that continues with indigo in villages of northern Viet Nam for example. Travellers' accounts contain references to such gardens. Only for Burma, and that long ago, has there been a systematic description of such dyestuffs (53). Most have long been superseded by aniline and similar dyes of western origin for these are more stable than most traditional vegetable dyes, some of which were cultivated and others collected from the wild. Their history has yet to receive systematic attention.

In the social and spiritual spheres, it is obvious that in the face of modern understandings and given the opposition of organized religion, many ancient agriculturally-based folk beliefs are on the way to extinction. The widespread notion of the 'soul of rice', Malay '*semangat padi*', is now seriously heterodox in many quarters, though it persists. Agrarian rites have been of interest to generations of anthropologists so that abundant material exists to trace their evolution, at least since colonial times.

### **Major gaps in environmental history**

The discipline of environmental history in Southeast Asia is in its infancy and has thus far focused mainly upon deforestation in the colonial and post-colonial periods. Deforestation for agriculture has taken two main forms. That for shifting cultivation, which results in a shift to grassland, scrub and various types of secondary forest, has been widespread for millennia though questions remain as to just how far they extended in the past. Potentially, may be possible to document such clearance by recovering charcoal from soils, for fire is a tool invariably-employed in preparing the land for crops. But recovering that evidence is likely to prove extremely laborious. Clearance for spatially more permanent systems has yet to be examined in detail though for the colonial era there exist considerable district-level data, much of it published in official reports. Once in agricultural use, land has not necessarily remained in the form of use to which it was initially put, usually rice. The intercalation of crops such as sugar, especially in Java and in parts of lowland Luzon and, especially some of the Visayan islands (Negros, for example) into pre-existing crop systems has not been as closely documented as it might be. Much the same is true for tobacco. The expansion of export crops resulted in both adaptation in situ and in the displacement of other systems yet is often discussed as if such pre-existing systems were absent. Admittedly in some instances they were.

Changes in the relationships of crops with climatic parameters are another seriously under-researched area. The late Simon Nieuwolt (54) has examined this relationship in modern times but with the expansion of settlement and selection of new strains of crop plants it seems likely that there may have been major changes in spatial patterns, especially in upland areas. Changes in the altitudinal limits of rice, for example, seem likely to exist. Equally, it seems possible that tropical crops such as the coconut are now to be found at higher elevations, further inland and at higher latitudes than once they were. Travel accounts seem likely to supply the raw material for such studies, for most travellers record their whereabouts, often on a day-to-day basis. Much the same applies to changes in seasonality. There are abundant records of the major stages of the cultivation calendar – tilling, sowing and transplanting, harvest - but how these may have changed needs analysis. Possible relationships with climate change remain unexplored.

In the more monsoonal parts of the region, rainfall can be quite unreliable. Drought was not infrequent and reports of complete crop failure are not rare. Auguste Pavie's detailed reports from Indochina, for instance, contain mentions of such matters (55). There is, as yet, no systematic analysis of drought and crop failures and their consequences in the region.

The effects of epidemic animal disease upon agricultural economies have been briefly mentioned earlier in considering the role of large livestock. But equally important are the relationships of human disease. Norman Owen's edited collection of papers in historical demography (56) is a valuable addition to the literature but its papers do not necessarily focus on the specific relationship with agriculture. People fleeing smallpox epidemics, for example, seem to have taken to the forest on occasion. Did they stay there long enough to settle and did they adopt culturally new forms of cultivation as a consequence?

Plant disease and pests have the potential to wreak havoc on crops. This was even more true before the advent of modern forms of control. Yet very little is known of such matters in earlier times. One serious periodical pest, one that could wipe out crops within hours, was the Asian migratory locust, *Locusta migratoria manilensis*, concerning which there are scattered reports from various parts of the region, commencing in the late nineteenth century. Leaf rollers and plant hoppers are likewise occasionally reported, especially in the reports of colonial-era district administrators. The histories of crop and animal diseases, of pests and their consequences do not yet exist.

### Archival sources

Perhaps the largest problem facing the agricultural historian wishing to use archival materials is their extreme unevenness. For the pre-colonial era epigraphs survive reasonably well. Not so paper. Of the indigenous records, there are significant materials that remain as yet unpublished and untranslated though that is happily becoming less true. In the Malay world a number of *hikayat* - chronicles - are now available. Examples include the *Hikayat Patani* (57) and the *Hikayat Negeri Johor* (58), but there are dozens of others. In the Thai realm, much the same is true of *phongsawadan*, traditional histories such as the *Nan Chronicle* (59). Unfortunately, most of these traditional histories contain very little of direct relevance to agriculture.

Pre-colonial land records also survive but these are limited in number and often very fragile. For example, the Malaysian Arkib Negara contains documents from the Kelantan land records of the early twentieth century. But in Peninsular Malaysia, most surviving land records date from the colonial era though it can be assumed that to some extent the earliest colonial records capture the immediately pre-existing situation. Hill makes some use of these in his *Rice in Malaya*.

Most metropolitan archives contain important materials on land matters in general, on the law relating to land and to policy matters. But because only selected items were sent or copied to metropolitan administrators, most agricultural mundanities were never transmitted and many are thus probably not preserved at all. The use of some major archives is hindered by the fact that indexing is very weak. This reportedly applies to both Spanish and Portuguese archives. However, the holdings at the Public Records Office, London, at the French *Archives nationales* at Aix-en-Provence and at the Rijksarchief and KITLV in the Netherlands are indexed but not necessarily easy to use.

By contrast, regional archives in Phnom Penh, Ha Noi and Vientiane are inadequately indexed and many documents, if they can be accessed at all, are in a poor state of preservation though that situation is steadily improving. Of the state of Burma's national archive little can be said. Its web-page does not even indicate the existence of an index. The important *Landsarchief* of the Netherlands East Indies administration has largely survived but reports suggest that it is difficult to use because of deficiencies in indexing. Matters are much better in Thailand and Malaysia. In both, a substantial proportion of the material is available in surrogate form, necessarily so for much is very fragile. The

indexing is also well up to international standards. The Philippine national archive is well indexed and easy to use but it is clear that the archive has been looted, it is thought during the Marcos era.

Agricultural historians have scarcely examined the archives of Christian missions in Southeast Asia though many are well preserved and well managed. To judge from an examination of material in the archive of the *Baslermission*, Switzerland, the proportion of relevant material is likely to be low but indexing is adequate and that alone may offset the low returns to effort that may otherwise be expected. The Jesuit archive for the 19<sup>th</sup> century Philippines is extensive and is steadily being worked up and published by Father Arcilla (60). Early Jesuit archives were dispersed as a result of the suppression of the Order in the 18<sup>th</sup> century but some remain at the Gregorian University, Rome. That is only one part of mission material for there were many Orders at work and at least some of their records survive. Augustinian archives exist in Rome, Paris, Dublin and elsewhere. The French *Missions étrangères* began in the 17<sup>th</sup> century and the mission was active in Southeast Asia, especially among non-Han peoples in southwestern China and in Indochina. Its archive is in Paris.

At the other end of the theological spectrum, beginning with Adorinam Judson at the end of the 18<sup>th</sup> century, Baptists worked extensively in Burma, especially in the once largely pagan hill districts. Both the northern and southern branches of the denomination in the United States retain extensive archives on foreign mission activities. Samuel Pollard, a Methodist, was posted to Yunnan in 1888, a forerunner of the many Protestant missionaries who worked in southwestern China, especially under the China Inland Mission, founded by Hudson Taylor in 1865. Much of its archival material is at the School of Oriental and African Studies, London.

Overall, it seems likely that missionaries of many affiliations played some role in agricultural history. Their concerns were not simply spiritual and their activities clearly included some related to agriculture, especially in respect of improved seeds, better tools and the introduction of draught animals. However, returns to searching effort are likely to be quite low, given the missionaries' basic focus on harvesting souls rather than crops.

### **Works before the nineteenth century**

As has been alluded to already, most of the region's epigraphs have been recorded and translated into one or other western language. A trickle of new finds keeps epigraphers busy but their main activity is now in seeking more refined understandings of existing material. The heyday of finds and recording was in the 1920s and 30s with notable activity by the *Ecole française d'Extrême Orient* in Indochina with some work in Thailand and by scholars in Burma, especially on Pagan (61). Epigraphs in Sanscrit, Old Khmer, Cham and Old Burmese were published in annotated editions often with accompanying translations. Notable are the many epigraphs recording temple foundations and donations. These list, for example, the numbers of workers and their tasks, the location and areas of agricultural land and in many instances at least some of the crops

grown upon them. One technicality that needs to be borne in mind in using these sources is that modern meanings of crop names are not necessarily those of the past.

For the Malay world, most epigraphs, many in Old Javanese and occasionally in other now-extinct languages, have also been recorded and translated though the body of work is somewhat smaller than for Indochina and the inscriptions are often less detailed. Used with care, as Vickery has shown, the epigraphic sources offer much in agricultural history.

As with inscriptions, so with major Chinese sources. Chou Ta Kuan on Cambodia is a basic source though limited in both time and space (62). Ma Huan, Admiral Cheng He's scribe, records brief descriptions of agriculture in the places visited in the *Ying-yai Sheng-lan* of 1433 (63). Chau Ju-Kua's account of the region is also a basic early source (64). Berthold Laufer and W.P. Groeneveldt long ago provided compilations of Chinese accounts of the region and these contain scattered references to agricultural matters (65). Laufer, incidentally, also has a useful set of materials on the Chinese in the Philippines and was also interested in the spread of American crops in the region, especially tobacco (66).

A major consideration in respect of things Chinese is the question of interpretation. Some would see much of traditional Southeast Asian agricultural technology as of Chinese inspiration, if not of actual introduction. The question of current-driven waterwheels has been mentioned previously - but other machines may be involved. One such seems to be the Chinese endless chain pump. This was certainly introduced into the Malay Peninsula by the early nineteenth century for the purpose of dewatering tin mines but so far as can be determined it was never used for agricultural purposes in that region. However, it survived as a tool for irrigation on the Chao Phraya plain well into the 1960s. The gate-harrow, widely used to reduce flooded padi fields to a fine tilth seems to be of Chinese inspiration and possibly of Chinese introduction though the matter remains open.

As sources for agricultural history, the indigenous histories are a disappointment though to suggest this is to reflect a misunderstanding as to their purpose, which was substantially to serve to legitimate whichever ruler happened to be in power. Thus works such as the Burmese *Glass palace chronicle*, translated by Pe Maung Tin and G.H. Luce in 1923, (67) the *Padaeng chronicle*, translated by Sao Saimong Mangrai (68), plus the many *Hikayat* of various parts of the Malay world, though mostly translated, contain rather little material related to agriculture.

Indigenous legal texts are another matter. Though political power and social influence stemmed from the control of people rather than upon the control of land as such, land matters nevertheless figure fairly prominently in traditional legal codes (69). King Mangrai's code for the Lanna kingdom of northern Thailand contains much regulating land matters. The *Undang undang Melaka* has detailed provisions on land, tenure and use rights, on mortgages and on inheritance (70). M.C. Hoadley and Barry Hooker have a commentary and translation of the Javanese *Agama* (71) while V.E. Korn covered Balinese law in his *Het adatrecht van Bali* of 1932, translated into Indonesian as *Hukum adat Bali*. The *Adatrechtbundels* is another major source (72).

The body of western sources is considerable but many suffer from the fact that accounts were written by voyagers who penetrated little, if at all into agricultural hinterlands. This is less true for early accounts of the old Siamese capital at Ayuthia for this is located well inland. One notable exception was Wuysthoff's account of his penetration as far up the Mekong as Luang Prabang but he says little enough of agricultural matters (73). Many of these accounts have been translated from Portuguese, Spanish, Dutch, sometimes French and German, into English, often with scholarly annotations, which however, should not be totally relied upon. The Hakluyt Society, London, has published and continues to publish a notable series of such accounts. As with other translations some care needs to be taken. A particular difficulty is that then-contemporary observers naturally used some version of local terms for such things as they saw for which there was no equivalent term in their own language. Such renderings do not normally find their way into standard dictionaries and this can lead to some difficult-to-resolve puzzles.

The Dutch, in particular, were remarkable recorders in their administration. The *Batavia Daghregister*, a monumental 17<sup>th</sup> century collection of records of ships and their cargoes, was published from 1887 to 1931 (74). A similar record at Melaka remains in manuscript but has been partly worked through by Radin Fernando. Valuable as these are for the history of trade, for agriculture they suffer from the fact that although the records usually report the immediate port of departure before entry at the point of record, the provenance of their cargoes is not recorded. Such ships' loadings are thus suggestive rather than definitive.

One perhaps unsuspected source is botanical floras. These include accounts of crop plants. These sometimes say something about the manner in which they are cultivated and always something of the habitat in which they were found, '*in hortis*', in gardens, for example. Noteworthy here are various works by Rumpf (Rumphius) at Amboina in the 17<sup>th</sup> century (75) and Father Loureiro's *Flora cochinchinensis* posthumously published at Lisbon in 1790 (76). The former are in Dutch and Latin, though a modern translation and commentary in English exists, while the latter is entirely in not-too-difficult Latin.

### **Published sources, 19<sup>th</sup> to 20<sup>th</sup> centuries**

From about the middle of the 19<sup>th</sup> century, the number of sources containing agriculturally-relevant materials grew exponentially. This is particularly true of travel writing, abetted by interests not only in the 'exotic east' but also by purely pragmatic concerns in furthering trade and making money in the developing colonial economies. Descriptive accounts proliferated. As imperial administrations were established, government officers usually reported extensively upon their districts and many of such reports were published. Many continued in later years, for such officials were usually required to report annually upon their charges. Thus there exist shelves full of district reports for Burma and British Malaya, many containing much detail on agricultural matters.

Newly-acquired territory also provoked interest. Thus, Stamford Raffles' brief stint as Lieutenant-Governor of Java produced the monumental compendium that is the *History of Java* (77). Even the prospects of territory or of trade were enough to stimulate interest. William Marsden's *History of Sumatra* appeared at the very end of the 18<sup>th</sup> century though actual British control of territory, at Bencoolen (Benkulu) was politically and economically insignificant (78).

Territorial acquisition, or the prospect of it, sparked a great deal of important exploration. The account of the Francis Garnier and Doudart de Lagrée expedition up the Mekong (79), seeking a 'river road to China' - the phrase is Milton Osborne's (80) contains many observations of local economic activities and many were agricultural. The voluminous account by Garnier and his colleagues, long available only in the original French, has recently been published in English in an excruciatingly bad translation by Walter Taps (81). Henri Mouhot, in part financed by British interests, not only rediscovered Angkor but also recorded much of the agriculture of the areas through which he passed (82). Jules Harmand also made a number of epic journeys in the region (83). The French, having acquired a protectorate over Laos in 1893, must needs discover what they had obtained. The result was a series of journeys, mainly on foot, by Auguste Pavie and a considerable group of young Frenchmen under his direction, beginning at the end of the 19<sup>th</sup> century and continuing into the 20<sup>th</sup>. Their very detailed accounts of Laos, Cambodia, the Vietnamese highlands and parts of northwestern Siam, originally in French, have been partly translated into English, again by Walter Taps (84).

British explorers were active in the borderlands of Burma with India, notably in their search for the source of the Brahmaputra and in their exploration of the overland trade routes eastwards from northern Burma. Many of their accounts are preserved in publications of the Royal Geographical Society, London. Notable too are accounts by colonial administrators, especially J.G. Scott (85). The works of the Austrian ethnographer Christoph von Furer-Haimendorf, who worked for the British, represents early to mid-20th century ethnology and travel (86). The uplands of southwestern China were explored from the late 19<sup>th</sup> century and by the 20<sup>th</sup>, the region had become a field for western missionary endeavour, especially by the China Inland Mission whose associates provide interesting accounts of the region. Amongst the many foreigners to journey in the region was Alexander Hosie, the British consul at Shanghai (87). On a smaller scale were explorations in the Malay Peninsula to which a noteworthy expedition was mounted by Nelson Annandale and his colleagues in the early years of the 20<sup>th</sup> century (88).

In Sumatra, notable journeys were undertaken by John Anderson, the splendidly-named Frenchman, Xavier Brau de Saint-Pol Lias, who also explored for minerals in Perak (Peninsular Malaysia), and by P.J. Veth (89). The Norwegian Carl Bock made notable journeys in southwestern Borneo and in the Lao states (90). The Italian botanist Odoardo Beccari worked substantially in northern Borneo. Some of his botanical observations are recorded in his *Malesia; raccolta di osservazioni botaniche...of 1877-1890* (91). In central Borneo, A.W. Nieuwenhuis's traverse eastwards up the Kapuas river was an epic journey, one not lightly to be undertaken even today (92). Alfred Russel Wallace, the noted biologist, made many valuable observations in the Malay Archipelago and these

were extended by other naturalists in the 20<sup>th</sup> century such as F.W. Burbidge and Henry Forbes (93). Another naturalist, Franz Junghuhn, also traveled widely and wrote extensively on both Sumatra and Java in the mid-19<sup>th</sup> century (94), though his work remains mainly in the original languages, Dutch and German.

The work of field biologists, such as Junghuhn, is particularly important because their professional skills leave little doubt as to the accuracy of their observations, particularly in respect of the identification of crop plants. I. H. Burkill, noted earlier as the compiler of the *Dictionary of economic products of the Malay Peninsula*, wrote several other relevant works, especially concerning Old World yams, *Dioscorea* species (95). Manuel Blanco, in the Philippines was an earlier student of both cultivated and uncultivated plants while Elmer Drew Merrill made notable contributions in the study of crops as well as in the taxonomic field (96). For the Dutch East Indies, the compilation by J.J. Ochse is noteworthy (97). Amongst the many modern floras of the region, that of Java by Cornelis Andries Backer and R.C. Bakhuizen van den Brink may be consulted, but there are many others, including some on line (98).

For the historian, using botanical materials poses two problems. First is the unfamiliar nomenclature. Fortunately, for most crops, this has not changed significantly for several centuries and many bear their original Linnean epithets. Second is the unfortunate fact that many compilers of floras fail to distinguish between cultivated and wild plants. Some, the guava is one, may be both. The historian must therefore have prior knowledge of which is which before some floras can be used.

Linguistic lines of evidence for the history and prehistory of agriculture have long existed in the form of vocabularies, the collection of which has extended over several centuries. Some include brief comments pointing to the sometimes remarkable similarities of crop terms in various languages. Not until the middle of the 20<sup>th</sup> century, however, were the basic language relationships worked out in detail. Paul Benedict was a noted contributor in this area. The idea is that terms may indicate origins. For example, in Malay, manioc, an introduction from the Americas, is known as *ubi belanda* or *ubi castela*, respectively the Dutch or Castilian (i.e. Spanish) tuber, probably reflecting the proximate source of planting material. Two other American crops, pineapple and cocoa, are termed respectively *nanas*, clearly from *ananas* or some variant thereof, and *koko* or *coklat*, probably ultimately derived from the Olmec term for the crop. If a language lacks its own word for a plough, for instance, it is likely that its speakers did not know the implement. Little has yet been done to examine agriculturally-related terms in a systematic way. A notable exception is Waruno Madhi's recent work on some Austronesian maverick proto-forms with cultural and historical implications (99). Nicole Revel's recent *Le riz en Asie du Sud-est* also shows what can be done in this field (100).

The work of learned societies and museums has contributed much to the supply of source materials. In 19<sup>th</sup> century Europe many cities supported geographical societies. In France, there were major groups in Paris, especially the *Société de géographie commerciale*, with kindred societies also at Bordeaux and Marseille, cities to a degree dependant on overseas trade and thus foreign intelligence. In London, the Royal



Geographical Society filled the same function. Its publication, the *Geographical Journal* and its earlier congeners contain many first-hand reports of places and peoples. Similar organizations existed in Germany, at Berlin and Hamburg for instance, and in the Netherlands. Their publications remain of interest. The same cannot be said of smaller geographical societies in Spain, Portugal and Italy whose publications contain little about the region. In the 20<sup>th</sup> century, geographical publications include the *Annals of the Association of American Geographers*, founded in 1911, the *Geographical Review* begun five years later, and *Economic Geography* from 1925.

Ethnographic reports are also a basic source of information. Many found their way to the Ethnographical Society in London or to similar societies in the Netherlands, Germany and Austria (Vienna). At Hamburg, the Gesellschaft für Natur- und Völkerkunde Ostasiens and at Dresden the Museen für Tierkunde und Völkerkunde made significant collections, like museums elsewhere, including artifacts related to agriculture. In the United States, the now-prestigious *American Anthropologist* began in 1888 as the *Transactions of the Anthropological Society of Washington*. Within the region, the *Sarawak Museum Journal* began remarkably early and contains considerable material. In Peninsular Malaysia the *Federated States Museums Journal* began later but contains little on agriculture. French students of ethnology or ethnography have made notable contributions for 150 years. The *Société d'Ethnographie* of Paris goes back to 1859 and its bulletin, since 1913 entitled *L'Ethnographie* has made notable contributions to the literature. Similar societies existed in provincial cities such as Grenoble and Colmar.

Specifically agricultural journals in the Philippines began in the early years of the 20<sup>th</sup> century, mainly at the initiative of the new American government and the Faculty of Agriculture and Forestry at the University of the Philippines, Los Baños. In British Malaya, the *Malayan Agricultural Journal* began in the 1920s, but from the outset, its main focus was upon commercial crops, especially tree-crops such as rubber. In the 1930s, the *Office du riz* at Saigon, the outlet for commercial rice production in Cochinchina, produced a number of valuable economic and technical studies. Overall, though, most of the articles in agricultural journals were written for other professional agriculturalists, certainly not for local farmers. They are an invaluable source for the history of agricultural science in Southeast Asia, a history that is largely yet to be written, but they are rather less valuable for the generalist.

The colonial era also saw a proliferation of general journals initially aimed mainly at the educated expatriate population as well as being journals of record. Though very heterogeneous in content, these remain an invaluable series of sources. For Indochina, the *Bulletin de l'Ecole française d'Extrême Orient* remains a basic source, despite its bias towards cultural history, archaeology and language. The *Bulletin économique de l'Indochine* contains a great deal about indigenous agriculture while the *Bulletin de la Société des Amis de Vieux Hué* casts its net much wider than its title suggests. Of a more popular nature are the *Revue indochinoise* and its companions *Extrême asie*, *Extrême asie – revue indochinoise*, and *La revue indochinoise juridique et économique*. For Burma the *Journal of the Burma Research Society* from 1911, is fundamental as is the *Journal of the Siam Society* from Bangkok, commencing in 1904.

In insular Southeast Asia, an early periodical publication from Singapore was the *Journal of the Indian Archipelago*, sometimes called *Logan's Journal* after its publisher, though this was rather short-lived. The *Journal of the Straits' Branch, Royal Asiatic Society*, later the *Malayan* and the *Malaysian Branch*, remains a basic source for that part of the region. A basic source for places where the Spanish had missions is *El correo sino-annamita*. It was published from the University of Santo Tomas, Manila, which appears to have the only surviving full run. Unfortunately this title appears not exist in surrogate form. Journals on the Netherlands East Indies were quite numerous and included the *Indische Gids*, the *Tijdschrift voor Nederlandsch Indië* from 1871, the *Bijdragen voor Taal-, Land- en Volkenkunde* from 1853, and the long-running *Tijdschrift voor Indische Taal-, Land- en Volkenkunde* from 1852. Virtually all the articles in the East Indian journals were in Dutch, as all those from Indochina are in French and those from Malaysia are in English. That language is also the predominant language of the Siam Society publications and of the Burma Research Society, though there are occasional articles in them in Thai and Burmese respectively.

### **Research aids**

Until recently, there was no bibliography for the history of Southeast Asian agriculture. R.D. Hill's *History of indigenous agriculture in Southeast Asia – a bibliography* is now published in electronic form (101). This contains some 13 000 entries, some of which are for titles now known not to contain agriculturally-relevant materials. The list is largely of published materials and includes articles in a number of major journals in English readily accessible on line via JSTOR or SEAV. This listing does not include many of the voluminous Dutch language materials. Colleagues at the KITLV are well placed to provide a bibliography at some future date and are working through such materials, as a considerable list of publications by Boomgaard, Henley and their colleagues testifies. Hill's bibliography is backed by an archive, currently with its author.

There are, in addition, many hard copy bibliographies for the region as a whole or for its major constituent parts though the listings for Indochina are now old as are those for Burma, though they remain useful. Here mention should be made of R.D. Hill's French and English index to the *Revue indochinoise* and its associated titles, published in 1983 under the title *Index indochinensis* (102). Many other journals remain incompletely indexed and, so far as is known, none of the major regional journals has back runs available on-line - a serious deficiency.

### **Conclusion**

In addition to the obvious need for a good knowledge of what has already been written, any agricultural historian needs a fair working knowledge based upon field observation. Without it the historian may fall into serious error. Remote places still preserve the old ways to some degree and are increasingly accessible for study. As always though, care

needs to be taken in projecting present practice backwards in time. Agricultural change has not proceeded at the same pace as urbanization, but it has its own rhythms. It is clear, for instance, that in the region generally crop assemblages have changed through time. American crops seem to have expanded them considerably. (Imagine Southeast Asian cuisine without pineapple, tomato and chilli!). Nevertheless, there is evidence, albeit fragmentary, that crops have dropped out of the repertoire all together or have become much less common than once they were.

The historian also needs knowledge of the scholarly consequences of getting things wrong. The assumption that the shifting cultivation of rice on hill slopes represents a very early stage of cultivation is demolished by a simple fact of plant physiology, as has been mentioned already. The general question of why land-rich societies would wish to intensify production by multiplying crops on the same land has not been fully addressed. The assumption that brilliant civilizations, like Angkorean Cambodia, were necessarily supported by equally brilliant agricultural technology can likewise be challenged. The irrigated terraces of Bontoc and Banaue in the Philippines, or of the Nagas of the Assam-Burma border area, are technically brilliant in the understandings of construction methods and water control their builders display. But there is no high civilization in either region. Necessary and sufficient conditions are easily confused.

At the detailed level, error is also perilously easy. David Chandler, in his otherwise excellent *History of Cambodia* (103), notes Chou Ta Kuan's account of the place in the 13<sup>th</sup> century. Chou says that the people 'one time plant, three time harvest'. From this Chandler concludes that the land was of exceptional fertility, which it is not, with three or four crop cycles annually. Just how such could have been fitted into a year even with a continuous water supply, that is not likely to have existed, and with the kinds of rice varieties available then, Chandler does not explain. The simplest explanation and thus the one most likely to be correct, is that the people indeed did exactly as Chou recorded. That is they planted their rice in one year, harvested it and then left it for another two years to provide two more ratoon harvests before tilling and planting again.

Translations too, have their perils. The value of Alcina's *History* for the history of agriculture in the Visayas has already been mentioned, but the translation is defective in places because of a lack of understanding of what the holy father was talking about. George Coedès's estimable *Inscriptions du Cambodge* is a fundamental source for the period (104). But even Homer can nod for Coedès has guava, an American crop, in 8<sup>th</sup> century Cambodia. Obviously he has assumed that a word now applied to this fruit was also applied in the past. A similar error occurs in the modern translation of the Javanese *Pararaton* (105). Current scholarly opinion holds that there were no crops of American origin in Asia until after Columbus, though it is just possible that amongst them, the sweet potato did in fact reach the Pacific earlier.

Clearly there remains much to be done. Prehistorians have very firmly put present-day political boundaries aside in developing whole-region syntheses. Not so most historians. For example, the idea that there are homologies between the agricultural systems of aboriginal peoples of southern China, the Indo-Burmese borders, the Ryukuyus and those

of the core of the region is not new but has never been adequately researched. More generally, it must be said that while there is abundant opportunity for comparative studies amongst countries, cultures and regions, for the most part those opportunities have been neglected. Valuable as they are, the books listed earlier are not comparative at the larger scale. If historians are really serious about the unity of Southeast Asia as a distinctive region, for all its internal diversity, then they need to set about casting their net more widely than has generally been the case. True, there are practical difficulties - the many languages of the source materials, their inaccessibility, until recently the lack of a comprehensive bibliography for agricultural history, the lack of adequate indexes to archival resources, the poor conditions of actual documents. None are insurmountable. The amount of published material alone is very large. Some of it, particularly the botanical material, has scarcely been used by historians.

At the same time, materials exist for accounts at much finer scales. The Malaysian archives, for example, contain colonial-era detail right down to particular administrative districts, even single villages. The published Burmese district reports are sufficiently detailed to permit the tracing of the evolution of agriculture at that fine level of detail. They have been drawn upon in part by R.D. Hill in his *Rice in Malaya* and by Michael Adas in his *Burma delta*, but those works have by no means exhausted their potential.

Language problems have also led to the under-use of untranslated materials, notably in Chinese, Japanese and German. While many of the earlier Chinese accounts have been translated, there remain significant materials in the original language. The Institute of Southeast Asian Studies in Xiamen, Fujian province, has some of these and there may well be other materials elsewhere. Much of the Japanese materials are secondary, though drawing upon work by generations of Japanese nationals in the region, especially in Taiwan. That of Kano is only one example (106). Much of the work done at the Institute of Southeast Asian Studies, Kyoto University, has been published in English, usually within a short time of its appearance in Japanese, but not all of it.

The German material dates mostly from the late 19<sup>th</sup> century down to the Second World War but is rarely cited. The German periodical literature is far from negligible. Larger contributions have been made by people such as Ferdinand Blumentritt, incidentally the confidant of José Rizal, Carl Semper, whose travels are a mine of information, and the splendidly-named ethnologist Freiherr Egon von Eickstedt (107). Junghuhn has already been mentioned. The geographer Wilhelm Credner worked in Siam and Yunnan (108). Another important German geographer is Albert Kolb whose magisterial book on the Philippines was published as late as 1942. His posthumously published monograph on Yunnan is also of interest (109).

The history of agricultural technology in the region scarcely exists. There has never been a Southeast Asian equivalent of the work done by Joseph Needham and Francesca Bray who have covered the topic so well for China (110). The degree to which local crops and methods of cultivation may owe something to Chinese farmers has never been systematically investigated though there are tantalizing hints that indigenous farmers

have taken up some of both from the Chinese. The many Chinese Brassicas (cabbage group) and the gate harrow are examples.

Like the Chinese, it seems likely that foreign missionaries were also the source of new crops and improved methods. The published materials on foreign missions are substantial. Letters from Jesuits are still being published. Both the Spanish and the Portuguese have had active programmes to transliterate letters and reports and to provide the necessary scholarly supporting apparatus. Much relevant material probably remains in church archives scattered across the globe. This writer's experience, however, is that the returns to the effort of searching are likely to be low. Published materials are usually indexed, of course, but from experience, indexes are not always reliable.

Perhaps the largest hindrance to a major thrust in writing the histories of agriculture in the region are the perceptions that economic history is a bit dull and that agricultural history is even more so, or that it is 'too technical'. Techniques, like languages, can be understood with a bit of effort. The dullness, if it exists, lies within the minds of the beholders. Without history, present-day patterns of agricultural activity cannot be fully understood. But more to the point is the fact that agricultural history is the history, often the recent history, of millions of families across the region. Most Southeast Asians remain only a generation or two away from the field, the garden, the flock and the herd.

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