

Chapter 4

Expansion of Thai Agriculture - from 1200

As Tai power over local States grew, what may now be considered Thai agriculture began. The bounty of the lands which Tai, Khmer, Mon and others had settled inspired civilizations to flourish under the protective prosperity of easy and guaranteed food supply. The usual ebbs and flows of human success led emerging Tai communities to assume control of Mon-Khmer cities producing a new culture that was a portent of Thai approaches to external ideas. Just as the people of Thailand today reflect diverse ethnic origins, so do the technologies that the culture identifies as its own. First among the technologies are those related to agriculture, and in particular wet rice cultivation.

Agricultural Organization

The political success of the Tai is sometimes traced to civil organizational skills learnt from the Nanchao Kingdom, although much about the Kingdom is conjectural. Later Tai adoption of Mon-Khmer systems broadened such skills. Such analysis belittles the organizational skills demonstrated by the Tai over centuries in the annual and perennial construction, maintenance, and use of the *muang fai* irrigation systems. These relied on strong community organization,¹ including water rights and pricing systems, and the recognition of the water manager as the leader of the area served by a scheme. The community strength which derived from almost total reliance on such a social organization, with associated legislation for equitable and sustainable use of the system, provides an alternative means of understanding Tai abilities which led to their succeeding the Khmer at the margins of the declining Empire.

¹ Attwater, R. (1998)

Considered from this perspective, the role of the King as the ultimate water manager and societal representative to propitiate water controlling spirits is as much a logical extension of the social system of the Tai *muang fai* as it is the Mon-Khmer systems. The Burmese Kyaukse² river-tributary based irrigation system, the Khmer dam and canal system, and Tai weir and community-based irrigation technologies were precursors of irrigation systems that eventually tamed the Chaophraya environment. Their combination is an indication of the strong assimilative character of the Thai, possibly adopted through mixing with the Mon, and the underlying role of agricultural organization in forming the Thai culture. When this fundamental ethic of secure food production was neglected, the society foundered, as may have occurred in the frenetic monument building in the last decades of the Angkor Kingdom when siltation of irrigation schemes seems to have been uncontrolled, or uncontrollable.³

Agricultural Administration

The centrality of water control in agricultural development in the region led to the evolution of central governance to manage reliable food surpluses; this in turn allowed political development in religious and/or military guises. The wealth generated from agriculture and related industries enhanced trading interest that fueled external contact and ideas, some of which related to agriculture. The Javanese design of a U-shaped dyke across a river constructed in eleventh century Angkor territory is indicative of religious and trading contact, as well as a long tradition of international technology transfer in agriculture.⁴

Possibly the major engineering influence in Thai water management derives from the reservoir and canal systems of the Khmer. These were centered on reservoirs which were either dug out or built above the ground and served by an aqueduct connected to a stream, and by rainfall. Over time, technologies evolved to manage sedimentation and water losses; for example, canals around the inner edge of reservoirs that could be readily dredged, and around the outer edge to collect seepage waters. The earliest known example of this system dates from the seventh century at the Wat Phu ruins in southern Lao-PDR.⁵

² Taylor, K.W. (1992)

³ Rogers, P. (1996)

⁴ Dumarçay, J. and Smithies, M. (1995)

⁵ Dumarçay, J. and Smithies, M. (1995)

Later integration of roads, bridges, and rivers created the broad mandala that is understood today as Khmer architecture. These developments appear to have occurred long before any major influence of the Tai on engineering works, and the ongoing problem of sedimentation in the Khmer systems which led to the breaching of larger streams to access more water for reservoirs, likewise speaks little of Tai influence. At these times, the Tai continued to favour sites adjacent to reliable watercourses, or on well watered plains where they refined social systems and technologies that could ultimately blend with the evolving, yet unsustainable, Khmer system.⁶

Integrating Irrigation Systems

The conventional Thai historical viewpoint of Sukhothai as the first site of Tai domination is convenient for discussion of agricultural development. Sukhothai and its near neighbour, Srisatchanalai, were archetypal Khmer cities; their origins, governance, the raising of cosmic symbolism above utility in architectural and landscape designs including in the use of water, are all common to Khmer cities. Square block fields, temple ponds, the large *barai* reservoirs, and even an artificial mountain in the case of Sukhothai, are Khmer developments which were maintained by the Tai.⁷ Managing the Khmer system was complex for the aquatically disposed Tai, and sedimentation increasingly affected the viability of Khmer sites. This probably led to increased reliance on Tai agricultural techniques to produce rice on the lower flood areas in contrast to the Khmer supplemented rain-fed system on naturally raised terraces. Hence integration of agricultural systems probably began out of necessity, thereby contrasting with social arrangements where the trappings of civilization from the Khmer appear to have been adopted unquestioningly by the Tai .

However, the reasons for Tai rejection of the Khmer management system for water may have other explanations. Perhaps the management of the rainfall and flood recording systems, surveying contours, operating sluice gates and siphons, and the constant maintenance of reservoirs and canals exceeded Tai capabilities of the time.⁸ Alternatively it may reflect a belief that the system was unnecessarily

⁶ Dumarcay, J. and Smithies, M. (1995)

⁷ van Liere, W.J. (1989)

⁸ Jumsai, Sumet (1997)

elaborate for rice production when Tai techniques allowed similar levels of reliability of production from more sustainable and less labour-intensive systems based on simple river weirs and canals.

Tai assumption of the Khmer mantle may have tempered rice production culture. The intricate association with cosmology in the architecture of the Angkor civilisation has oriented modern interpretations of the water diversion systems to be similarly associated with the religion. The thousand lingas through which the Siem Riep River flowed before the waters were to be used by the city at Angkor is interpreted as a religious hydrological system.⁹ However, the societies which created this culture relied on a continuous supply of rice and such diversion systems would more likely have originated as small interventions to serve agriculture and the city, and have been attributed a religious significance to protect their integrity. As the society became more refined, mundane reasons for religious associations may have been subjugated to the expansive religious architectural work that increasingly deified the King. The pragmatic organization of the usurping Tai tribe rejected the inferior and labour inefficient rice production systems of the Khmer while blending other trappings of power including ceremonies, the role of the King, and gods associated with water and sites, with their own Buddhist and animist beliefs.

Learning from the Sukhothai experience, the Thai developed hydraulic skills for irrigation which complemented their essentially aquatic skills derived from life in flooded environments, and with their simple and resilient *muang fai* system. Larger rivers were tapped by the *muang fai* system until, by the Ayutthaya era, another emerging Tai power built the largest Tai Kingdom on the security of modified main river flooding.¹⁰ The combination of the technologies gained by the Thais over centuries is evidenced in these systems and the construction of the first storage irrigation system in 1633 at Ayutthaya,¹¹ an echo of the Khmer storage *barai*, and the comparatively tiny *muang fai* systems of the traditional intermontane Tai.

Tai of the northern Lanna Kingdom enjoyed a relatively stable lifestyle within the periodic vicissitudes of warring states. As the last stronghold to fall to

⁹ Siribhadra, S. (1999)

¹⁰ van Beek, S. (1995)

¹¹ Arbhahirama, A. et al (1987)

the colonizing Thais after they had conquered the delta environment, the chink that weakened the Lanna Kingdom, appears, as with the Khmer six centuries earlier, to have been a neglect of the underlying agricultural economy. An ambitious building program consumed many resources created from rice surpluses, thereby leaving the Lanna Kingdom vulnerable to infiltration and attack.¹²

The agricultural system of the North, based on *muang fai* irrigation, remained viable long after Lanna's fall to the Thai, further indicating its suitability to produce continuing surpluses. By this time, the Ayutthaya Thai had codified water control works to reduce floods, supplement rainfall to create a known environment for rice cultivation, and even to grow off-season rice crops.¹³ Not to be confused with today's systems, these early delta irrigation systems delivered the requisite water from an inundation *khlong* with simple control systems that could fail completely if a season was overly wet or dry. However, the extensive delta and its relative under-population ensured that there was an area from which sufficient rice could be harvested.

The evolution of Tai water management and rice production techniques reflect Thai cultural evolution.¹⁴ Traditional Tai agriculture used broadcasting of seed to plant rice in flooded swamps and river overflows, whereas Khmer agriculture on elevated sites required transplanting to maximize use of scarce water. Transplanting was later adopted by the Thai as they intensified production systems. The Tai staple of glutinous rice remained important for local consumption, particularly in the Northeast and the North, while non-glutinous varieties predominated overall through higher yields and international demand. As irrigation systems became more complex, organizational systems that could manage continued success in agriculture, were developed, emerging over more than fourteen centuries as modified forms of the ancient administrative units of *Ban*, *Muang*, and *Nakhorn*.

The *Ban*, *Muang* (Thai spelling different from *muang fai*), and *Nakhorn* of the Central Plains are mainly located facing rivers, reflecting original transportation systems for rice production and all communication. Expansion from rivers was

¹² Penth, H. (1994)

¹³ Donner, W. (1978)

¹⁴ Ishii, Y. (1978)

along canals dug to improve irrigation, or to open new areas to irrigation. Thus *Muang* developed where river tributaries joined a main river, and *Nakhorn* where navigable rivers and land or sea routes intersected. By contrast, the Northeast *Ban* and *Muang* reflect the expansion of a community to a neighbouring naturally-raised area surrounded by swamps in which rice was cultivated. In the South, agricultural and trading settlements developed along sand dune ridges and at river mouths, with the administrative units reflecting trading importance or population density. In the mountainous North, the interconnection of separate *Ban* on a river where the *muang fai* irrigation system was practiced, created an affinity which continues today;¹⁵ *Muang* consolidated a group of *Ban* in a valley or geographically contiguous area, with *Nakhorn* being the major trading centres in larger valleys of the North. This administrative system, still largely in place today, reflects the agricultural history of the Thai. From a society civilized by agricultural surplus, expansion to control a wider region relied on agribusiness trading, and judicious use of agricultural wealth to create a nation.

Agricultural Domination

Fuelled by secure rice surpluses, a Thai identity emerged around the thirteenth century. The wisdom of modifying the naturally flooded environment for rice production rather than creating an environment for rice on elevated terraces, points to a sound understanding of the environment in agricultural terms. This rise of the Tai may be related to two factors of continuing importance; an embracing culture which rapidly internalizes useful innovations from elsewhere, and insistence on rice production, albeit an apparently less demanding task than food production in most other regions of the world. The adaptability of the Tai is evidenced not only in the usual Sukhothai story, but also in other contemporary Tai centres such as at Chiang Mai, and what was to become Ayutthaya, each based on adoption of agricultural technologies suited to the particular environment.

Varying interpretations of the capabilities of the Tai have been offered. Their tribal origins, the apparent absence of an internally generated script or an organized State, might suggest that they were simply adequate farmers who travelled rivers, but had not developed skills in the large scale hydraulic irrigation of their

¹⁵ Vallibhotama, S. (1989)

neighbours.¹⁶ Other interpretations suggest large-scale migration from Yunnan provoking confrontation with the Khmer Empire. Most likely is that the Tai communities which had formed from migrating over centuries¹⁷ had, by association with the Sukhothai Khmer outpost and through their population reaching a level which allowed rebellion, inevitably rose to dominate. Whatever the mechanism, control over rice was central to political success. A unifying view of Tai history prior to the fourteenth century resonates with rice-field numbers in the names of various Tai States, such as northern State of *Lanna* and the autonomous region of Xishuangbana in Yunnan province of southern China, *Sipsongpanna*.¹⁸

Control of rice fields and their resident tax paying population provided the three resources of food surpluses, revenue, and manpower for military expansionism. Through this mechanism, the Tai gained control over smaller, sometimes other Tai, States, and absorbed them into their own.¹⁹ That the Tai successfully expanded, suggests an understanding of reliable rice agriculture with associated organizational systems. Skills may well have included; agricultural and land administration, taxing systems for rice, and military expansionist approaches learned from other Kingdoms as Tai groups worked within them in their slow southward migration.²⁰ However, details of pre-Sukhothai Tai systems, with the exception of the irrigation-based organizational system, are sketchy and later institutional creation of a Thai national identity has clouded perspectives on the era. Nevertheless, expansion led eventually to conversion of the last available lowland area to rice; the Central Plain, once rejected by the Tai and others as too wet and difficult to manage, was drained, and managed as the culmination of Tai expansionism and rice production.

Tai to Thai Agriculture

Under the influence of commercial success in trading, the South attracted increasing Tai interest and eventual dominance.²¹ Agriculture of the South relied on rice as elsewhere, and used techniques of the influential trading groups including

¹⁶ Rawson, P. (1967)

¹⁷ Wood, W.A.R. (1959)

¹⁸ Schultze, M. (1998)

¹⁹ Credner, W. (1935)

²⁰ Thomson, V. (1967)

²¹ Taylor, K. W. (1992)

Indians, Persians, and Chinese. Tai power was slow to arise and less absolute than elsewhere in Thailand as indicated for example, in the diversity of rice harvesting techniques, even today. As distinct as the Khmer stream and reservoir system to supplement rainfed rice on elevated terraces was from the Tai *muang fai* system, so is the southern harvesting of only the rice raceme distinct from the usual harvesting of the whole plant elsewhere in Thailand. Eventual Tai success of the South involved absorbing such practices notwithstanding the presence of large numbers of Tai persons from the Central Plain and the North, including those captured in an attack on Chiang Mai in 1390 and removed to one eastern and three southern provinces.²²

The security of rice production provided security of a Kingdom that then required skilled political management to grow. A pinnacle of Tai culture and its *muang fai* irrigation system, the Lanna Kingdom of the North generally prevailed against invaders over seven centuries. Yet it was eventually defeated by other Tai who had by that time absorbed new technologies and cultures that allowed them to control the delta region for rice production, provided they had access to labour resources. Reliance on the balance between manpower and rice production for political security fuelled military expansionism and the beginning of democratic rice production systems. Since before the time of Ayutthaya, an approach to ownership of the productive capability had been institutionalized as *sakdina* or 'field power', whereby a person's social level was signified by the number of rice fields one was allocated, with use of this right in the settlement of legal disputes.

The power which control over consistent rice surpluses created is increasingly well documented from the Ayutthaya period.²³ For example, fourteenth century Chinese travel accounts note Siam as an exporter of aromatic woods, rattan, and beeswax, with abundant fauna providing rhinoceros horn and kingfisher feathers, from a culture secure in its production and trading of rice while supporting local crafts and importing fine cloths, paper products, and precious metals.²⁴ From such a base, other communities might have moved to a wider trading role using their security and power to control trade routes. However, the limited trading involvement of the Thai reflects a weaker position compared to major trading powers

²² Wyatt, D. K. (1984)

²³ Ishii, Y. (1971)

²⁴ Terwiel, B.J. (1991)

of the era, such as the Middle East, India, and China, and increasingly Portugal, the Netherlands, and Britain. It may also reflect an insularity which assisted continuing expansion of rice production, as indeed occurred through the Ayutthaya period.

The contrasting self-sufficient yet assimilatory culture that the Tai inherited, is consistent with the centrality of wet rice as the source of the civilisation. It fuelled expansion to the whole Chaophraya basin and some adjacent areas in a manner which proved more politically durable than that of Tai cousins in Myanmar, Lao-PDR, and Vietnam. Even in the Assam culture, where Tai attained local power, they largely lost contact with their original culture. In Thailand, the mixed culture and races retain much of what was Tai in a powerful agricultural exporting country, while other perhaps ethnically more uniform Tai groups have been subsumed into other cultures, or in the case of Lao-PDR, are economically dominated by Thailand and other neighbours.

Development of the delta was not achieved until the twentieth century at what is now seen to be significant environmental cost. The floods common to large parts of the delta required new approaches to water control. In part of the current Ratanakosin period, between 1831 and 1967, four floods have fully destroyed, and eight have seriously damaged, a rice crop, and in another 40 seasons water shortages have affected rice production significantly.²⁵ Such variability in the water environment throughout the earlier period of Tai expansion into the delta, explains original views about the difficulty of the environment; its development is a testimony to the perseverance of a culture which knew its success relied on always producing a rice surplus. If a Tai approach to food production is defined through the period leading up to a Thai identity entering the world's awareness, it would be one of managing the natural environment to produce a rice surplus for security and trade from the lowest human inputs possible. Thus agricultural life determined a large part of the Tai, and later, Thai culture.

Agricultural Life

Intensification of agriculture increased impact on the natural environment. The simple life afforded by Tai and Thai agriculture included practices that today would be termed sustainable, as may be said of most of the world's systems that

²⁵ van Beek, S. (1995)

supported low populations over millennia. Providing abundant yet, until relatively recently, simple fare, agriculture changed over time with the culture, leading to an exotic complex of animism, Buddhism, and other Indian religions to include special agriculturally associated beliefs.

Up to the Khmer period, food production was conducted on small areas surrounded by vast forests. Environmental variations were constant. The rainfall regime is often assumed to have been even, the river flows to have been predictable, and soil fertility to have been replenished annually by natural silt deposition;²⁶ but none were constant over these centuries and the environment required modification to suit rice agriculture. In addition, each successive year of population increase led to higher environmental pressure culminating in the major impact of reservoirs, stream and river diversions, and ponding of rice soils. Nevertheless, the traditional wet rice cultivation system remains one which belies the maxim that sustainable agricultural systems are those which have minimal impact on the natural environment.

The Tai diet was a combination of rice supplemented with meat from small animals such as frogs, fish, and to a lesser extent insects, with occasional meat from hunted animals of the forest, including gaur, deer, and bear. Naturally occurring vines, trees, and aquatic plants provided variety according to season with some species being encouraged in early kitchen gardens.²⁷ The diversity of the diet increased with external contact, particularly the contact afforded with the Mon-Khmer, Indian, and other traders until about the fourteenth century, and then particularly with the Portuguese and other western traders. In the Khmer period, the diet is recorded as being predominantly rice and fish supplemented with milk from cows and goats, meat from pigs as well as from deer and other forest animals, and fruits including mango, lychee, papaya, and oranges.²⁸

The simplicity of the Thai diet at the time of early Western contact is indicated in descriptions²⁹ of rice, fruits, dried fish, and water as being common fare for all levels of the social hierarchy,³⁰ within a custom of not over-consuming

²⁶ Sagarik, R. (1989)

²⁷ Ramitanondh, S. (1989)

²⁸ Murray, S. (1996)

²⁹ Gervaise, N. (1688) [1928]

³⁰ Caron, F. and Schouten, S. (1671) [1986]

at any one meal. Killing of domestic animals seems to have been forbidden by the religion while killing of wild animals was known, if infrequent.³¹

Now eulogized as a lifestyle consistent with nature while providing for all, the continual development of new technologies and political expansionism ensured that a return to the past was impossible. New agricultural technologies met at least one of the two criteria of:

- reducing labour inputs consistent with the ethic of reliably producing food with minimal human input
- meeting the demands of a rising population.

Thus the Khmer system of Sukhothai was modified to control water from larger rivers and the traditional *muang fai* system was blended with the reservoir system of the Khmer, such as constructed at the complex at Srisatchanalai. Over the same time, the environment was also changing naturally at a rate faster than that caused by humans. The site of Ayutthaya, originally having been chosen for its coastal proximity, is today distant from the coast, and one of the most fertile rice producing areas of Thailand.³² Thus Thai food production systems both modified the natural environment, and capitalized on and enhanced natural changes in the environment for human benefit.

Agriculture defined lifestyle and subsequently law, war, and religion. Rice was the chief cause of civil litigation in Khmer and succeeding Tai Kingdoms. Wars of the era which frequently seem to have been indecisive to analysts today are made intelligible when it is recognized that they were conducted between rice growing seasons. Returns to the battlefield depended on successful rice harvests, themselves increasingly dependent on the valued spoil of war, labour.³³ An association with Buddhism is claimed to have made the Thai more empathetic with the natural environment,³⁴ although such links often prove tenuous with the analysis presented in a later chapter. Animistic practices maintained in parallel with Buddhism were accepted in association with donations of rice fields, draught animals, and slaves to temples.³⁵

³¹ Buri, R. (1989)

³² Moore, E. et al (1996)

³³ Thomson, V. (1967)

³⁴ Buri, R. (1989)

³⁵ Vallibhotama, S. (1989)

Prescriptions about the auspicious siting of plants around houses,³⁶ propitiatory rites associated with rice gods, and rain-creating ceremonies each found their way into the Thai view of Buddhism. The development of the religion, as with agriculture, shows an attitude of absorbing new practices to blend with traditions. Animist beliefs about the natural environment arising from fear of its power and uncertainty were reduced by technology which modified nature to suit humans; this initiated a trend of natural resource exploitation long before external contact.³⁷ Such dualism continues to be reflected in the tension between the Thai Sangha and the forest monks today³⁸ with the interesting outcome that the latter are often unwillingly pitched against officials when development conflicts with conservation of the natural environment.

The influence of agriculture on Tai life up to the time of Sukhothai established cultural norms which have been centrally fostered in the developing of the nation which became Thailand. To belittle the links between wet rice culture and Thai culture leads to an erroneous interpretation of the motivations behind agricultural and developmental change, and even the Thai world-view. Sukhothai provides a convenient metaphor to explain the importance of rice in Tai and Thai history; it remains relevant whether Sukhothai was a precursor to Ayutthaya, or simply one of many Tai *Muang*³⁹ of the time, of which one, Ayutthaya, rose to dominate the whole of Thailand. Likewise, the popularly quoted Ramkhamhaeng Inscription ascribed⁴⁰ to the era consolidates the agricultural wealth of the Thai culture in its words ... *in the water there is fish, in the fields there is rice* ... and in its praise of bountiful forest products and rice surpluses for trade. From such a background, agriculture seemed assured of a continuing central role in Thai thought.

Summary

Key points pertinent to Thai agriculture that may be elicited from this period include:

³⁶ Sukwong, S. (1989)

³⁷ O'Connor, R.A. (1989)

³⁸ Phongpaichit, P. and Baker, C. (1997)

³⁹ Kasetsiri, C. (1976)

⁴⁰ Wyatt, D.K. (1991)

- Rice has been central in; community formation, development of civil leadership from water managers, and forming the foundations of the administrative structures of Thailand.
- An embracing and pragmatic nature has facilitated discriminate absorption of technologies and cultural elements in an ongoing cultural evolution that has produced a resilient dualism in production of domestic and export/urban rice varieties, and religious beliefs associated with agriculture.
- Traditions of environmental modification and social adaptation to changing environmental conditions has enabled Tai agriculture to continually produce significant surpluses from minimal human inputs in a society which favoured a simple cuisine.