Climate, ecology and cultivation in early Penang

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In a few years after his landing on Pinang island in 1786, Francis Light submitted an elaborate report to the Directors of the East India Company outlining the prospects of the new settlement. A rosy future was foreseen; trade would flourish, immigrants would flow in and the island would sustain all its inhabitants through extensive agriculture. Settlers of a variety of nationalities were indeed already streaming in and newcomers were allowed to settle and occupy cleared land. However, Light's enthusiasm was not shared in Calcutta, where merchants and officials during the first year of the settlement's existence considered Penang to be a distant and unpromising outpost, where the most hardened criminals could be deported. In the 1790s it was in fact suggested that Prince of Wales Island should be abandoned in favour of the Andaman Islands, another centre for deportation. Straits Settlement records from this time show that debates about Penang's existence as a British factory were dominated by arguments regarding the island's advantages over the Andamans: The geographical and strategic position was paramount, as it was argued that the Andamans were closer to the sea route between India and China. Penang, on the other hand, was said to offer an abundance of shipbuilding materials, and due to its position, would better act as a naval base for British operations. Significantly, Penang was seen as having better prospects for cultivation and agriculture.

It was in the context of these debates that a number of British publications appeared in defence of Prince of Wales Island. Sir Home Popham's *Description of Prince of Wales Island in the Streights of Malacca* was published in England in 1799 and reprinted in 1805. The author had visited the island in 1791 and been much impressed by its harbour and prospects as a naval base, but also by the promise of agriculture and food production. Norman Macalister, a commander of the artillery who had served in Penang for ten years, submitted a pamphlet entitled *Historical memoir relative to Prince of Wales Island* to the East India Company and the British Government in 1803. The most influential of the treatises was written by George Leith, Lieutenant Governor of Penang from 1800 to 1803. Leith's *Short Account of the Settlement, Produce and commerce of Prince of Wales Island in the Straits of Malacca* was published in London in 1804. These publications provided, for the first time, more detailed information about the new settlement, with the aim of promoting the islands strategic and commercial value to the East India Company. Apart from arguments relating to regional trade and trade routes to China, more attention was now given to the advantages of the island itself, as it was claimed that the climate and soil together would provide an abundance of food, wood and a 'luxuriancy of supplies', all of which contributed to give the island a 'geographical, military, commercial and political advantage over every other situation in India.' Although these writings might not have reached a wider reading public in Britain, they raised the Company's expectations, later described as 'extravagant and unfounded'. In any case, they served their purpose and resulted in the declaration of Prince of Wales Island as a fourth Presidency of India in 1805.

The new status signalled the arrival of civil administrators and military personnel, but Penang was also visited by an increasing number of casual travellers, official visitors, commercial agents and company traders, whose reports were published as travelogues or official reports. For many of the early visitors this was a first close encounter with tropical nature, and early travelogues and reports painted idyllic pictures of Edenic luxuriance, 'constant verdure' and picturesque landscapes, accompanied by enthusiastic predictions about the settlement's economic prospects. One of the most popular travels books of the early nineteenth century, Johnson's *Oriental Voyager*

summarized the traveller's impressions of the island with a long passage praising the sublime beauty of Penang's landscape, concluding that 'this will be the most beautiful, healthy and flourishing settlement in the East Indies'. The skies of Penang, Johnson wrote, were always 'clear and serene' as Penang was blessed with a particular 'purity of atmosphere', which had given the island a reputation as having a better climate and a 'healthier situation' than anywhere on the Indian subcontinent.

Penang was now named the 'Montpelier of India'; in comparison to India the climate of Penang was seen as 'infallible' as it had 'neither the great vicissitudes of Bombay, the marsh effluvia of Bengal, or the scorching heat of Madras.' Two years before Penang was made a Presidency, the Company's agent William Hunter had reported to the Government in Calcutta that 'there is probably no settlement in India where Europeans enjoy better health, or can endure with impunity more exposure to the vicissitudes of the weather'. Penang had, in fact, already by 1805 gained a reputation as 'the healthiest spot in India', and ailing British officials, such as the poet and linguist John Leyden, were sent from India to Penang in order to recover their health. Here, Europeans could seek the coolness of the Penang's hills, in a time when the hill stations on the subcontinent had not yet been set up as places of convalescence for Europeans. The topography of the island was seen as unique in the East Indies, 'not too mountainous nor marshy', and Penang Hill with its Convalescent Bungalow were seen as 'the chief charm of Penang, and have made for it a reputation quite independent of its commercial importance, and give it rank as one of the sanitaria of India.'

From the earliest descriptions of Penang, the abundance and variety of production had been seen as the island's most prominent asset. Francis Light's assurances that Penang would be able to feed its own inhabitants was echoed by Elisha Trapaud in 1788, who eagerly told his readers that the island provided 'wood, cattle, hogs, poultry, canes and rice were cultivated, together with fruit and vegetables, all in the greatest abundance and the most reasonable prices'. The perceived abundance and the fact that provisions could be obtained at low prices was seen as originating from the assumed fertility of the soil. The cool hills of Penang were expected to produce European vegetables and wheat, and Popham wrote warmly about the prospects of rearing cattle in the mountains of Kedah.

Cultivation before 1805

In the early arguments for Penang's suitability as a naval base, the supply of timber was pointed out as the islands main asset. Trees tall enough for 'masts of any dimension' was easily available, and it was assumed that the Penang's forests contained teak trees which would give the settlement a distinct advantage over Bencoolen and the Andamans as a future centre for shipbuilding. However, it soon became clear that no teak or indeed suitable timber for shipbuilding was to be found on the island but had to be transported from Burma. A shortage of skilled labour contributed to the failure of shipbuilding in Penang; only two frigates were built before the plans for a naval base were abandoned in 1812. By that time timber was already being transported over from Province Wellesley, providing 'planks for houses and coffins', furniture, as well as wood for handles for *krises* and musket stocks.

The promise of Penang's forest did not materialise, but from the start Francis Light's plan had from the start been to raise revenue 'from the land and not from trade,' and this was mirrored in the unbridled optimism regarding the settlements agricultural prospects. Light had been given instructions by the Company to rear sheep, cattle, hogs and poultry, and by 1788 a considerable number of fruit trees, coconuts and plantains had already been planted. In 1792 it was

reported that an abundance of tropical plants and 'all the vegetables common in India' were produced by 'industrious Chinese' and 'natives of the coast of Coromandel'. Explaining that the quality of the soil varied throughout the island, Light insisted that that rice could be grown in plenty on the plains, whereas the coolness of the mountainous parts of the islands would provide growing conditions for almost every kind of European fruits. Light furthermore suggested that 1-200 sheep should be to be sent from Bengal every year, 'from these examples the probability of the island affording sustenance for its inhabitants is no longer doubtful, it becomes a certainty!'.

At an early stage, the range of soil qualities were noted in official reports, while other commentators assessed the islands prospects for large scale cultivation. The shallow topsoil could be observed, for example, when the very first buildings were erected. It was reported as 'a matter or wonder' that trees could grow so tall with their roots growing along the surface, and warnings were issued against leaving large single trees standing. On the whole, however, most areas were seen as sufficiently good for the production of grain or pasture, even the very sandy soil 'when dressed and manured' should be able to accommodate vegetables, with seeds imported both from Europe and India.

The swiftness with which large areas of forest were cleared for cultivation astonished early visitors to Penang. The cutting down of trees was done by convicts and Malays, in a manner that was novel to the European observers: the trees were cut six or seven feet from the ground, after which the trunk was cut up and mixed with root and brushwood, then set on fire. The ashes from this procedure served as manure, but it was observed that 'much timber is destroyed which would be valuable in any other situation, but the price of labour here is so high, that it could not bear the expense of transporting.' The remaining stumps were also described to give the landscape a most 'barbarous appearance'. The preparation of the soil for cultivation was done by Chinese.

During the first years of the settlement's existence Light had allowed settlers to occupy land they could clear. No proper land survey was undertaken until after Light's death, which meant that land could be occupied under promise of future title. During these early years, however, no limits were set to the amount of land each person, European or local, could acquire. Large areas were therefore snapped up by Penang's few Europeans, in particular Francis Light and James Scott. Groups of Chinese were allowed to occupied land and set up small holdings. This lenient early land policy was further complicated by the high mortality which meant that lands changed owners quickly. The situation improved with the arrival of British administrators, and by 1800 a substantial number of land grants had been issued, and a land survey was underway.

The first commercial crops in Penang were coconut and pepper, both indigenous plants. Pepper had been grown in the region for several hundred years. In the fifteenth century pepper had been grown commercially in northern Sumatra, and by 1600 pepper cultivation had spread to Aceh, but also to Patani on the east coast of the Malay Peninsula and West Java. The next century saw pepper plantations in the interior of Sumatra, the Minangkabau highlands, Benkulu (the British trading post on Sumatra), Ligor and coastal Vietnam. But pepper cultivation had a profound impact on the environment. It required the clearing of primary forest, usually in an area close to an export port. Pepper vines began yielding crops only in their third year and continued to produce for 20 years at the most. After this a new area had to be cleared, while the cultivated land slowly generated into secondary forest or turned into grassland covered with *alang alang*. This meant exhaustion of the soil, but also that the planting and maintenance of pepper required skills and knowledge about growing conditions. From the start, the Chinese had employed more intensive farming methods than the Malays, and by weeding and cultivating the ground had been able to reuse exhausted land.

In Penang, the first pepper plants were introduced in 1790 by Capitan China Che Kay who had brought pepper vines from Aceh, with financial help from Francis Light. Pepper cultivation took off with a pace that surprised many. By 1798 a total of 533, 230 pepper vines were planted, covering 7-900 acres. By 1801 this had risen to half a million vines, and production increased rapidly. Although pepper was grown in plantations owned by Europeans, it was reported that cultivation was carried out by the Chinese, who 'with characteristic industry' also grew pepper in small holdings in many parts of the island. The high quality of Penang's pepper was indeed attributed to the experience and skills of the Chinese. Thus the inferior quality of pepper grown in Sumatra was explained by the 'haste of the Malays to gather the fruit before it is sufficiently ripe'.

However, pepper would, more than other spices, be vulnerable to international price fluctuations as well as and cultivation costs. High cost of labour was a constant subject of complaint in early Penang, which probably explains why the labour intensive cultivation of gambier did not become widespread here. In the other Straits Settlements pepper was always grown in conjunction with gambier, a product used for dyeing and tanning, which required an elaborate process of boiling the gambier leaves. William Hunter had supervised experiments with boiling of gambier around 1803, but when it was found that the production costs were higher than the market price of imported gambier, the plants were dug up and pepper vines were planted in their place. Thus a more versatile planting system had to give way to a one-crop system, a less sustainable use of land.

Penang's pepper early attracted botanical and commercial interest in India. The Company botanist William would publish the first botanical treatise on Penang, entitled 'Remarks on the Species of Pepper, which are found on Prince of Wales's Island' in *Asiatic Researches* in 1808. In his *Flora Indica* (vol 3, 1820) William Roxburgh included several species of pepper found in Penang, both earlier described by Linnaeus and Rumphius. The interest in the pepper plant and its cultivation shown by the East India Company was driven both by utilitarian and scientific ambitions. During Penang's early years, the island became the center of botanic exchange in the region. Through its botanists and employees of the Gardens in Calcutta the East India company took an active interest in the mapping of the region's flora, with the objective of setting up spice plantations in Penang in the hope of breaking the Dutch spice monopoly. The center of this activity was the Company garden in Ayer Hitam.

The Garden had been set up under Light, and was initially operated using convict labour. However, the convicts were decimated by sickness and in 1803 William Hunter, who seems to have been in charge of the gardens at this time, asked the Governor Leigh permission to employ Chinese. By 1805 it was reported that the Gardens were looked after by 80 coolies. Light himself had introduced cinnamon, 'kayo-pootie' and many other useful plants. Coffee plants were brought from Java and pimento trees arrived from the botanical garden at Calcutta. A boost to the Company Garden came when Britain took over the Moluccas in 1796. By this time, the Company had appointed a botanist, Christopher Smith, who was sent to Penang and then on to the Moluccas to collect not only spices but also other living plants. This way the Company gardens in Penang received shipments of both ornamental and useful plants, such as canary nuts (canarium) and sugar palm (Kabong, Arenga saccharifera).

The first substantial inventory of the Company's garden was carried out in 1803 by William Hunter, a surgeon with the East India Company, who like many of his contemporaries had an interest not only in the natural sciences but also was an avid Oriental scholar. Hunter would perish in Java in 1812, shortly after the British invasion of the island. His manuscript 'Plants of Prince of Wales Island' was published only in 1909. This list of 62 plants illustrates in a tangible way the role Penang played at this time as a place of botanical exchange and transfer. On one hand, the list and had a purely scientific goal, as Hunter was able to determine and describe a number of

new plants, while others were known through works such as Burmann's *Flora Zeylonica* or Rumphius' *Herbarium Amboneseˌ* both published in mid eighteenth century. Many of the plants were said to have been brought from China, mainly ornamental shrubs, but also edible berries (genus Flemingia, H.). and Corchorus capsularis, used as hemp. Another kind of hemp, Volkameria (Clerodendron) had been brought from Amboyna, together with a great number of plants and fruits, such as pineapple and Kaya Puteh. Hunter's list also included plants used by 'Malay physicians', such as *Conyza balsamifera* which was successfully used to cure what was probably 'beri-beri', which had broken among the 'Polygars confined in irones', i.e. rebellious chiefs sent from India, who were engaged in public building work and road work. Other 'useful' plants included species of *Gnetum*, the bark of which was used in fishing nets in Amboyna, whereas the leaves could be eaten as spinach.

Hunter's manuscript reflects both a purely scientific, botanical, interest and a search for new economic and medicinal plants of this hitherto little known region. The natural world of 'India extra Gangem' (modern day mainland Southeast Asia) was largely unknown to the British compared to the Indian subcontinent. Due to Dutch unwillingness to allow publications about its Eastern possessions, very few publications had presented and described the region's flora. It was therefore not surprising that the new settlement of Penang attracted considerable botanical interest. Early administrators in Penang, such as Stamford Raffles and William Farquhar, were keen plant collectors. William Roxburgh had plants from Penang and the archipelago sent to him in Calcutta, where he cultivated and described them, carefully noting the potential uses of plants such as 'caoutchouc' and various hitherto unknown fruits. Roxburgh's successor as director of Botanic gardens in Calcutta Nataniel Wallich, would himself travel widely in the Malay Peninsula.

The Company garden in Penang, however, came to an abrupt and sad end in 1805, when it was sold at auction on 12 days notice by the governor Robert Farquhar, who, it was said, instead chose to spend large sums on 'his own luxury and on useless fortifications'. The spice trees were dug up and carried away by buyers, but most died in the process. A second garden was founded in 1822, still in Ayr Hitam. This new attempt was overseen by the 'botanical schoolmaster' George Porter, and existed until 1834 when Governor Murchison sold the garden for 1,250 rupees 'because his wife could not get enough vegetables from them to diminish the cost of her cook's bills'.

Nutmeg & clove

In the later eighteenth century, the long standing Dutch monopoly on the cultivation of nutmeg and cloves had first been challenged, mainly by the French, and it was as part of this race for spices that nutmeg arrived in Penang. The French East India Company had attempted to bring spice plants from the Moluccas to Mauritius under great secrecy. The French physiocrat and later governor of Mauritius Pierre Poivre had been sent to Southeast Asia in the 1750s with the explicit orders to acquire seedlings of nutmeg plants, and finally secured nine precious living nutmeg plants in Manila. Further plants were sent to Mauritius in 1770, and by the 1780s several smaller shipments of nutmeg and clove seedlings had reached the island. Acclimatisation of these plants to a new environment proved difficult, and attempts to grow nutmeg on a larger scale were plagued with problems. The director of the botanical gardens in Mauritus, M. Cere oversaw the nutmeg project, and in 1783, small quantities of dried cloves reached Europe. By that time, nutmegs and cloves had already been distributed throughout France's tropical possessions, and by 1790 cloves and nutmeg were grown in Zanzibar, Madagascar, Martinique, Granada and Réunion. It was not before 1800 that the nutmeg plantations in Mauritius would yield harvests for commercial production. By this time, the British had also taken up the nutmeg race by establishing plantations in the islands of Penang and Sumatra.

Soon after his arrival, Francis Light had found wild nutmeg growing on Penang island, and reported back to Calcutta that the nutmeg itself was not very good, but that the mace was 'hot and pungent', and he expressed great hopes that this indigenous plant in fact could be 'improved by cultivation so as to become an article of commerce'. Although this nutmeg was sold by Chulias in Penang's markets, it soon became clear that this was in fact a different species, and not the true commercial nutmeg. In the 1790s Light obtained a small number of nutmeg plants from Mauritius 'at high cost'. These plants did not survive and nutmeg cultivation in Penang would perhaps never have materialised had Britain not acquired the Moluccas.

Shortly after the Moluccas had changed hands, the previously mentioned Christopher Smith was sent there with the explicit orders to dispatch clove and nutmeg plants to Penang. In 1798, 600 nutmeg seedlings and half a dozen clove trees arrived in Georgetown, accompanied by five slaves from Banda nutmeg 'parks' especially sent to look after the spice trees. The early sources and reports give slightly diverging information about the size of these first shipments, but it seems that most of the nutmeg trees were put up for public sale, some were already at this time planted on Chinese owned holdings. Plants were also sent directly on to Kew and the Botanical Gardens in the Cape, but most of these early samples of nutmeg were sent to Calcutta, where three male trees blossomed for the first time in 1803.

Although many of the earliest spice seedlings died, there were already 1300 spice plants in the Company's gardens by 1800. During the year 1803 nutmeg and cloves arrived in Penang on 7 different ships from March to September. For the voyage, the trees were divided up into boxes containing large and small plants, and seeds, but larger specimens tended to expire during the voyage. These relentless shipments of live spice plants seem to have taken Penang's planters by surprise. William Roxburgh, director of the Calcutta Botanic Gardens, urged William Hunter, who at this time seems to have been in charge of the Company Garden, to do his outmost to have the arriving trees planted out quickly, either in the Company's plantation or 'distributed amongst such gentlemen as are in possession of land fit for the growth of this tree'. Visitors to Penang at this time marveled at the extensive nutmeg and clove plantations owned by the company and on private estates, both European and Chinese. It was on one of these plantations, owned by Mr Caunter, that the first nut was produced in the year before Hunter's visit; the tree 'including its growth before transplantation' was estimated to be ten years old. The Court of Directors requested that Penang's spice planters should be given encouragement, as it was now suggested that this island was 'the most eligible spot of all the East India Company's possession for spice cultivation'.

In 1802, Lieutenant Governor Leith could provide Calcutta with a detailed report on the nutmeg plantations owned by the company, pointing out that experiments had to be undertaken to determine which parts of the island would provide the best soil for nutmeg. Another dispatch from William Hunter in 1802 gave an extremely detailed description of the methods of planting and maintaining the nutmeg tree. But, for the first time, Hunter also pointed out that the soil of the island was probably unable to retain the moisture needed for nutmeg trees, and he suggested that measures, such as banking up soil, should be taken in order to prevent water from running off too quickly.

The Presidency

Penang's status as a Presidency was declared in 1805, sustaining hopes that the island would become a center of spice cultivation. Penang now produced 27,000 *pikuls* papper, of which three quarters were classed as suitable for the European market. Although the quality of Penang pepper was regarded as superior, the fortunes of the pepper planters deteriorated quickly when the

changing international situation resulted in price falls in Europe. Pepper exports to China were always smaller in comparison, as pepper was available in China; it was also difficult to find space on board China bound vessels. In 1809 the Penang government was urged to discourage pepper planting, and in 1810 it was reported that 'a large proportion of the island formerly in high cultivation (had) again reverted to its original state of Jungle.'

The first pepper boom in Penang was over, but the pattern was by now set: the spice plantations would be mainly worked by Chinese, who had early been identified by the British as the most 'valuable' ethnic group. Chinese workers also provided a safer commercial alternative for European planters, as they usually were contracted to set up the plantation and work it for a certain number of years (usually three). After three years it could again be let out to a Chinese farmer for five years or more, with little risk taken by the European plantation owners.

The production of pepper was increased after the fall of Napoleon, but this was a short lived revival. Pepper prices in London fell again after 1817 and this continued until 1820, when an 'immense and unsaleable amount of spices' were held in London warehouses . For Penang, this meant that a few major planters, such as David Brown, were able to buy up surrounding small holdings, owned by Chinese and Malay. Penang's pepper plantations would not recover; by the 1840s pepper production on the island was insignificant. The cultivation of nutmeg and mace, however, continued throughout the first half of the nineteenth century; these spices were not subject to extreme price fluctuation, and were also of superior quality, by many regarded as 'the finest in the world'.

However, reports and despatches as well as travel journals seem to confirm that there was little knowledge among European settlers about the methods of cultivation of spices. There were also many unknown factors such as the effect of different soil conditions, which had to be determined from experiments. For example, there was no experience upon which the lifespan of spice trees could be ascertained. Although everyone agreed that the nutmeg lived much longer (60-70 years) in the Moluccas, it had been observed in Malacca that the nutmeg tree seldom lived longer than 24 years. Despite the interest expressed by the Government in India, European planters received little official guidance or indeed encouragements until the 1820s.

The difficulties facing the spice planters were not only caused by insufficient horticultural knowledge. Spice cultivation was dependent on large inputs of capital, labour and time, as commentators dryly advised prospective planters: 'if he be in haste to get rich, let him attend to some other pursuit'. Spice crops had long maturation period, and could not be expected to produce return for several years. In the early years, there was also a very limited supply of skilled agricultural labour and costs were high. In the West Indies and the Moluccas, slave or convict labour had been used to run spice plantations. As seen above, Penang's first nutmeg plants in fact arrived with slaves to look after them. However, commentators on Penang's early agriculture assessed the use of free labour as a decided advantage over 'slave employing states'. Although the Chinese carried out most of the work related to spices, Indians from the Coromandel Coast were seen as good plantation workers and also appears to have been keener to work for monthly wages than the Chinese. The Malays were not widely used as agricultural workers, and this was taken up when arguing that Penang would always have an advantage over Bencoolen, as 'the wages given there to fickle Malayan labourers are the same as able-bodied Chinese receive at Penang'. Comparisons of wages for the different ethnic groups also show that Malays and Indians were consistently paid less than the Chinese workers.

Dependence on Chinese labour and enterprise was thus crucial to Penang's agriculture. There was, however, an ambivalent attitude among Europeans (and the East India Company) to the Chinese. The 'usefulness' of the Chinese to the economy of the settlement could

not be denied, but in 1836 James Low wrote that it would be in the interest of the Europeans to employ all ethnic groups to guard 'against the monopolizing spirit of the Chinese'. Whereas Europeans wanted legal title to the cultivated land, this was of less importance to the Chinese pioneers, who relied on cash crops that could grow almost everywhere and produce quick returns with relatively small investment and show greater commercial flexibility.

More importantly, it seems that the overall success of spice cultivation in Penang can be attributed to superior and uniquely Chinese agricultural skills and methods. In the first place, Penang's ethnic groups used different farming implements. The Chinese plough, as opposed to the Malay *tengala,* was more efficient in spice cultivation, as it turned over the soil into a furrow which provided a better planting ground for spices. British commentators also pointed out that it was the same plough which gave the Chinese an advantage over the Malays in rice cultivation on the mainland. The crucial factor, however, seems to have been the use of fertilizers, which was seen as the most important factor in successful nutmeg cultivation.

In the Moluccas nutmegs and cloves did not require fertilisers, consequently the Penang planters had to experiment. In Singapore the boiling of gambier produced residue for manuring pepper vines, but this was not available in Penang. One technique previously used by the Chinese was mulching with a mix of *lalang g*rass. In Bencoolen, where nutmeg plantations were established at the same time, fertilisers containing half cow manure and half burnt earth was used, spice planters were recommended to keep herds of cattle to supply the large amounts of manure required, as the manure should not be older than a few months. In Penang this could not be done as easily. The Dutch officer Nahuijs who visited Penang in 1824, reported that all spice planters had to keep large numbers on cattle, in order to produce manure, which in turn required substantial amounts of fresh water. Although British planters were involved in the experiments with bat guano, it seems that it was left to the Chinese to develop and make more efficient use of alternative fertilizers.

Alternatives to cow manure included human waste. This was praised as 'a very fertilizing and highly animalized liquid nutriment for plants (which) is obtained by macerating human ordure in water in proper pits for 4 or 5 months'. The Chinese cultivators maintained that once this manure had been used on a tree it was necessary to continue, or the tree would die. Later, it was reported that 'urine from coolie lines, or night-soil' was used to fertilise Penang's nutmegs. Pig manure was another fertiliser widely used by the Chinese, who kept keep pigs in sties 'with a floor of planking above a large cemented tank, into which fall all the excrements of the animals'. In Province Wellesley, where the Chinese were in charge of sugar cane cultivation, it was reported that fish, bat-guano and other manures were also used to produce 'large returns' from the land. In addition, Chinese cultivators used fertilizers such as ' prawn-dust, fish refuse, blood and oilcake imported form Java', but also carcasses of animals. Suffering nutmeg trees had even been seen coming alive had after 'a dead pariah dog or two were buried at their roots'. Bat guano from limestone caves, mixed with lime was also imported from Langkawi, but this was costly, and in 1830s and 40s the scarcity of manure became acute.

It could be argued that these inventive cultivation techniques enabled the rapid expansion of nutmeg production in the later half of the 1830s. There was also at this time a new enthusiasm regarding the economic prospects for spice cultivation. In 1836 James Low published the hitherto most detailed account of agriculture in Penang, *A Dissertation on the Soil & Agriculture of the British Settlement of Penang, or Prince of Wales Island, in the straits of Malacca*, and the Penang Gazette predicted that 'we would not be surprised to see the whole of the Island become one vast Spice Garden'. The main reasons for this optimism were the prospects of new markets opening up, as Low enthusiastically wrote that 'a market exists amidst the myriads of India, the ultimate extent of which, who will venture to appreciate? China, the whole of the

American states, Egypt and Turkey are a few of the countries which now bear the impress of civil and moral regeneration'. In the mid 1830s Penang and Province Wellesley accommodated thirty spice plantations, five large and seventeen smaller. A development which contributed to the nutmeg boom was official flexibility regarding the establishment of small holdings. This meant that a considerable number of small plantations were opened by Chinese 'squatters', who with the help of cash advances provided by merchants in George Town, began to plant nutmeg, but also indigo and vegetables in 'less favourable localities on the hills' and so initiated a new extensive program of jungle clearing.

In 1846 J. R. Logan made a journey from Singpapore to Penang, where he travelled widely around the island, exploring the mountain ranges for several months. His journal, which was published in the *Journal of the Royal Geographic Society*, much resembled the reports of earlier visitors. Logan's enchantment with the island and its inhabitants (whom he thought much nicer than people in Singapore) and its rolling landscapes was obvious, and he left the island with much regret, writing

> The exceeding magnificence of its mountain views, the richness and variety of their component parts, and the coolness and transparency of the atmosphere which this country enjoys, give a freshness and elasticity to the mind never experienced in the sultry plains of India. I have now explored nearly every part of the settlement, and hundreds of scenes most interesting and dissimilar have rewarded my toil. It is almost inconceivable how Nature, in so small a compass, has contrived to crowd such a wonderful diversity of objects.

Shortly after his visit to Penang Logan gave a lecture to the Asiatic Society of Bengal in Calcutta. Here we are presented with an entirely different picture of Penang's agricultural prospects.

Ecology and cultivation

In his speech, published under the title 'The probable effects on the climate of Pinang of the continued destruction of its hill jungles' in the second volume of *Journal of the Indian Archipelago* in 1848, Logan strongly criticised land policies in Penang and issued a stark warning that the uncontrolled expansion of cultivation, especially in mountainous areas, would have a longstanding ecological impact. These views have to be seen in the context of contemporary debates and Imperial concerns about deforestation, in the Indian Ocean, the British possessions in Africa, West Indies and beyond.

Since at least the mid-eighteenth century there had been a global realisation that deforestation caused environmental degradation through soil erosion. This had led to preventative measures in places such as the West Indies and Japan. Richard Grove has argued that the rise of environmental ideas in Europewere first developed on islands, through close observation of colonial plantation systems. Grove's study of eighteenth century Mauritius examined the development of a forest conservation programme which was closely linked to French physiocratic theories. But forest management considerations were not limited to the scene of French colonial expansion.

Although soil erosion and 'desiccation' been accepted as a potential threat to colonial agriculture since the 1790's, it was only in the late 1830's that debates on the climatological effects of deforestation gained momentum within the British colonial administration. These debates focused on India, as the government of India, the military authorities and especially the government

of Bombay Presidency became increasingly aware of the deforestation problem. The period 1837-47 has been identified as a period when critical arguments were presented by a handful scientists within the East India company medical services, who suggested that deforestation did not only cause soil erosion, but a change in rainfall and general climactic change, leading to drought and famine. J. D. Hooker, later Director of Kew Gardens, played a major role in alerting the Government of India to the possible consequences of deforestation based on observations made during a visit to St Helena and Ascension in 1842, and it seems that the increase in the publication of global case studies were crucial in the introduction of forest conservancy in India. Here, the important new concerns included fears of timber shortages, but more importantly still the realisation of the wider effects on the colonial economy. The reasons for environmental damage was now increasingly seen as a product of the agrarian systems of forest dwellers, which led to the emergence of 'tribal' anthropology in the late 1830s. This interest in the life and livelihoods of tribal peoples would have parallels in the Malay Peninsula, in the little studied publications on the customs, produce and method of cultivation of the groups now referred to as 'orang asli' which filled journals such as the *Journal of the Indian Archipelago*, edited by the above mentioned J. R. Logan.

The 1840s was then a time when evidence of the consequences of deforestation in India became available, through articles written by British administrators and colonial scientists. One of these was Captain T. J. Newbold of the Madras Light infantry, who published a paper in the newly founded *Madras Journal of Literature and Science*, based on interviews near Bangalore, where he was able to make a connection between the appearance of sand dunes, floods and deforestation. Newbold would later become heavily involved in the Straits Settlements and was the first British administrator to publish a detailed account of the Malay Peninsula. But, as Richard Grove has pointed out, the consequences of deforestation only gradually became apparent, due to shortage of global examples. Here, it seems that Logan's article on Penang became important as an example of the global scope of desiccation.

What was then Logan's concern? What he had observed in Penang as a worrying development was 'the great extent to which the plain of the mainland of Penang has been shorn of its forests'. He now called 'for a stop being at once put to a war with nature, which must entail severe calamities on the future.' His main complaint, however, originated from the recent development outlined above, as Logan attacked the authorities land policy, and ultimately the Chinese 'squatters', who 'in the last few years' had been responsible for the destruction of the jungles on Penang's hills, by clearing land in order to set up small holdings producing spices. Referring to Humboldt and Boussingalt, Logan warned that this ultimately would have a profound effect on Penang's climate. The consequences were in direct relation to the islands topography, as the disappearance of forest on the hills were, in Humboldtian theory, linked to mountains, where the forests were thought to attract and condense clouds. Mountain forests were crucial in that they prevented desiccation in the crucial areas which supplied streams of with water. The fault, Logan claimed, was not with the Chinese themselves but the fact that they had been able to buy any land they wanted. This was irresponsible, Logan maintained, since 'climate concerns the whole community, and its protection from injury is one of the duties of the Government'. Further examples were also provided: The 'the sultry atmosphere and dreadful droughts of the Cape de Verde Islands' were seen as a result of diminishing tree cover, as was the deterioration of climate and vegetation in several areas in India. Logan now called on the authorities to follow the governments of Germany and France, where special laws and departments had been created for the preservation of forests.

Logan's speech seems to have to been important in the collating of examples of how deforestation had caused environmental deterioration, and further made the Directors of the East

India Company see this as not a specifically Indian, but a global problem. In 1848 reports such as this, Grove has claimed, acted to 'alarm and even radicalise' the Madras government, and led to the formation of the Bombay Forest Department in 1847. Importantly, this also meant that the authorities accepted Humboldts theories on desiccation and general approach to the environment, acknowledging the need to balance short time goals relating to land revenue with longer term issues concerned with sustainability.

The impact of Logan's article would again become obvious in the 1860s, at a time when stemming the threat of global desiccation had become one of the major topics debated by the Royal Geographical Society. An active participant in these debates was James Wilson, who in a seminal publication presented a global survey of places where climactic change had taken place:

'in our own colonies of Barbadoes, Jamaica, Penang and the Mauritius, the felling of forests has also been attended by a diminution of rain. In the island of Penang, the removal of jungle from the summits of hills by Chinese settlers speedily occasioned the springs to dry up, and, except during the monsoons, no moisture was left in the disforested districts.'

It could now be ascertained with certainty, Wilson wrote, that desiccation and climate change was unnatural and 'entirely the consequence of human action'.

Conclusion

Throughout the first half of the nineteenth century, journals and diaries written by visitors to Penang would dwell at great length on the extensive views opening up from the promontory of Penang Hill. In 1814, John Wathen praised the high state of cultivation opening up before the viewer: 'Gardens, producing the most delicious fruit, are kept in the best order. The pepper plant is raised with great success, although it requires much care and skill in the cultivator. There are in this vale many extensive plantations of it, as well of rice, areka and betel, and groves of cocoa-trees.roads lined with a great variety of fragrant shrubs and trees which enjoy perpetual verdure'. Decades later, John Cameron who presented the region in the popular work *Our tropical possessions in Malayan India* (1865) wrote from the same spot: 'slopes are in most cases cleared, and smile out in healthy cultivation of pepper vines and fruit trees, and on the summit of many stand the neat bungalows of the residents, belted often by a fringe of cocoanut and areca palms.' To British writers, the island possessed a unique topography, a variety in landscape, vistas framed by the smallness of the island, which could be observed and enjoyed nowhere else in the East Indies at the time.

Apart from Bencoolen's pepper plantations, Penang was the first British agricultural enterprise in Southeast Asia, and in many ways constituted a laboratory for future tropical cultivation. A number of crops, not dealt with here, were attempted. Cotton seeds were imported from Bombay and Madras but were said to 'require great labor and trouble'. The failure was blamed on the unwillingness of the Asian inhabitants, and the Malays in particular, to work the fields. James Low wrote in 1836 that he had imported silk-worms from Calcutta and 'offered them gratis to the natives, but not one was accepted, although the mulberry thrives there, requiring only a very small degree of care to be bestowed on it. The same fate had nearly attended my offer of seed coffee, and other plants and grains'. Coffee plants did indeed initially thrive in Penang, but later expired, apparently due to lack of shade. Within a few decades, it had become clear that almost all food had to be imported, apart from the 'Malayan' fruits which were still available in abundance, and officials expressed fears that that the high food prices would hamper Penang's population growth.

As can be concluded from Low's account, there was an intense official interest in the soil conditions and other circumstances affecting future cultivation in the region, in particular in the decade after the founding of Singapore. As we have seen, cultivation of nutmeg and cloves were an experiment with many unknown factors. Low could therefore propose the theory that attempts to grow nutmeg and clove in India, Ceylon, Mauritius, Bourbon and the West Indies were due to fail, whereas in Penang nutmeg cultivation could and would succeed because it was situated on the great volcanic belt which stretches from 'Kampskatka to Barren Island in the Bay of Bengal'. Furthermore Penang was at the same 'distances to the north of the equator as the Moluccas are to the south of it'.

Speculations such as these show to what extent colonial agriculture had to be improvised in Britain's first encounter with tropical climates and soils. By the 1850's it was clear that the high hopes for a versatile agricultural production on Penang Island would not materialise. John Crawfurd wrote in 1856 that 'most of the anticipations here held have been realised, and some of them have even exceeded the sanguine expectations of the founder. The only serious exception relates to the supposed excellence of the soil'. The earlier assumption that corn could be grown in Penang was now labelled as a 'vulgar error derived from the notion that the land, which grows huge forest trees, must, of necessity, be fertile and adapted to produce the staple necessities of life,' there was only thin coat of vegetable mould over a sharp sand, or stiff clay'.

In the literary representation of India, recent scholarship has also evolved around the concept of 'tropicality' as an environmental 'other'. The work of David Arnold, in particular, has examined how in the period from the 1750s to the 1820s, the 'great world of the tropics' began to exert and influence and conceptions of nature. Tropical regions were increasingly characterised as a contrast to Europe through their plants and animals, but also increasingly through their peoples and diseases. But the tropical world was in itself contradictory, an Edenic place of plenitude and abundance, but also an unknown and dangerous place. Arnold has shown how India became 'tropicalized' in the nineteenth century, partly through the rise of scientific tropicality. The idea of tropicality here not only informed plant taxonomy but also economic botany, and became closely allied to the ideas of 'improvement' which began to reshape local Indian agriculture. I have here attempted to suggest that Penang in many respects became center of botanic exchange, but also for agricultural experiment and the slow realisation that tropical regions, despite its initial green appearance, would not be as fertile turned into colonial plantations or handed out to land-hungry 'squatters'.

Penang was unique in several respects. From the start, its inhabitants consisted of distinct ethnic groups which had previously no settled together. This was the first time the British colonial system became economically dependent on a Chinese population, and already Francis Light had predicted that the they would become the most 'useful' part of Penang's population. In his attempt to see the region inhabited by a Malay 'nation' Stamford Raffles at first nourished the idea that the Chinese were 'restless and vagrant' inhabitants of Penang, whereas the Malays were 'of the soil' and should become the most useful group if guided to 'improvement' by the British, but this plan soon had to be abandoned. The harnessing of Chinese inventiveness, skill and knowledge became a condition for the success of spice cultivation, and I have suggested that the new methods needed to successfully grow nutmeg and mace outside the Moluccas were ultimately in the hands of the Chinese cultivators.

Spice cultivation also became a metaphor for 'improvement' through benign colonialism. The Chinese eye for a quick profit was tempered by British patience for long term returns through careful husbandry, as expressed by James Low in his *Dissertation on the Soil & Agriculture of the British Settlement of Penang:*

‘Bright Improvement on the car of time,

Now rules the spacious world, from clime to clime;

Her handmaid arts now every wild explore,

trace every wave and culture every shore. ‘

Logan then goes on to describe the Malay peninsula.

‘on *Mudas* banks where tigers stole along

And the dark Samang yelled a dismal song

The wandering Devas of the forest glen

Now start to view the glittering haunts of men

And Silence, throned on Cherais cloven mound,

Now hears the gurbang’s chime and gong’s deep mellow sound’.

‘In other terms’ Low continued, ‘*Dominie i*s now stalking amongst the nations; with his right hand he majestically waves over their heads the talismatic rod for their mental correction and enlightenment, and with his left hand he scatters amongst them the seeds of science and art. Those who hold different opinions will not, of course plant spices, but will solace themselves perhaps with the cold philosophical reflection, that the prospect of gain is dimmed by the risk of war and of other political and moral changes which, spectral-like float before their eyes’.

By dwelling on the curious inhabitants emerging from the jungle, this poem also illustrates the novelty of the surrounding region, showing that in European eyes the Malay Peninsula was very much still a terra incognita which in its diversity, both physical and human, would open up to the British during the time dealt with here. The Penang pioneers, including Raffles, were keen to see their island in this light, distinct from the rest of India, a new ‘colony’ with new and interesting prospects.