Trade, Capital and the Development of the Extractive Industries of Northeast Tasmania

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This paper presents a system whereby the industrial sites of the forested areas of northeast Tasmania can be recorded so as to address questions of how they operated in the world economy of the later nineteenth and early twentieth centuries. A framework for analysing the raw data recorded at archaeological sites is outlined. The author is a PhD student in the Department of Classics and Archaeology at the University of Melbourne.

The extractive industries of northeast Tasmania began from around 1870 and were an important factor in the development of this hitherto largely unsettled area. At the same time, the world economy underwent an enormous expansion. It does not appear to be coincidental that the mineral and timber resources of the region were discovered and exploited just as the needs of the industrial nations, particularly Britain, were increasing. Rather, the rise and fall of these industries may be linked to events that took place on the other side of the world. This relationship is examined using a regional approach as it could not be understood on a different scale.

The theory underpinning this study is grounded in history and in economic history in particular. It is, nevertheless, the empirical evidence supplied by historical archaeological sites which forms the data base on which the theory is expanded, tested and revised. Of major concern therefore is the series of logical steps with which to make the move from the theoretical base through to the collection and analysis of the data and to the conclusions. As this paper presents work in progress, it concentrates more on approaches and the development of frameworks than on results.

In 1850 northeast Tasmania was largely unsettled and unexplored. By and large, the early convict period of the colony had bypassed this region. By the turn of the century, the region was dotted with numerous small towns, mining sites and timber mills while farms were established on all the areas of better soils. The area had become an important contributor to Tasmania's balance of payments largely due to the mineral wealth. By 1990 this landscape has altered again. The mines are now disused and the methods of timber harvesting has changed. The places where these earlier industrial activities took place is today returned to forest and, having played their role in the development of the region, have all but disappeared from the modern landscape. These changes form the evidence of the study. The story of the people who pioneered the settlement of the region and how this was related to its natural resources and the benefits to be gained from them is little known. The remains of their labours survive as historic archaeological sites.

THEORETICAL POSITION : THE WORLD ECONOMY 1850–1920

Patterns of foreign trade and the structure of commodity prices are subject to change over time. Each country has endowment in terms of land, minerals, skills and machinery. The value of these can be altered by external factors such as changing product demand, by the movement of capital and labour and the spread of technology. It may also alter by internal factors such as the accumulation of domestic capital, discovery of new products or raw material, population changes, technological progress or by government policy. Whatever the structure of competitive costs, the size of the trade flows between nations will also depend on the existing level of transport costs. Any reduction in these will enhance the opportunity for trade.[1]

During the nineteenth century the Industrial Revolution which had begun in Britain gathered pace and began to effect change and development in many areas of the world. The scope of these are well known and the details need not be reiterated here. It will be sufficient to clarify the nature of the demand for raw material in terms of volume and type, the changing price structures and the availability of foreign capital.

The earliest phases of the Industrial Revolution were based around the textile industries of Britain. Large amounts of cotton, wool and timber were needed to keep the machinery fully employed. The colonies of Australia were well placed to provide wool for the looms and the wood to build the machinery which was most often water powered. Transportation of raw material and finished products to markets was provided by sail power.

As the decades passed, Britain found that profits were to be made in foreign investment. Up to about 1850, this excess capital was invested in Europe, South America and the United States. As the European countries used this capital to invest in their own industrialisation, British investors found that they came under increasing competition from the French, the Belgian and later the German entrepreneurs. Interest in investment in the United States took some time to return after the War of Independence and the changing political situation affected investment. Given this political uncertainty, investors looked to the Empire as a safer alternative.

Changes in the accumulation of capital and its availability for foreign investment as well as the countries to which it was directed altered significantly in the later part of the nineteenth century. Britain continued to be the major supplier of capital investing over 4,100 million pounds overseas by the end of the century. This accounted for an average of 4% of the National Income and was to further increase to a high of 9% by 1914. The Empire accounted for 34% of all British foreign investments by 1870. India attracted over 60% of this for railway construction. Australia took another 25% in the

1880s with Canada absorbing much of the rest. Canada overtook Australia in terms of capital investment after 1904.

From about 1870 technical innovation moved from the textile and iron industries to the steam powered industries of steel, machine tools, electrical engineering products and chemicals. The pace of change hastened. Between 1880 and 1913 petroleum production doubled every 8-10 years, copper every 13 years, pig iron, phosphates, coal and zinc every 15-17 years and lead and tin every 20 years[2] which led to exhaustion of the more readily available supplies of minerals. There was intensified activity in the exploration for new sources which, while a risky investment, could and did provide good returns for the original investment when a rich field was struck.

The importance of the development of steam ships, railways and the increasing use of steam engines portable enough to drive machinery in remote locations cannot be overemphasised.[3] By 1869 iron steam ships had made serious inroads on sail ships leading to a concomitant decrease in ocean freight rates on long haul journeys. For the Australian route, the opening of the Suez Canal in 1869 reduced travel time and hence costs. Conversion from iron steam ships to steel began in the 1880s which allowed the long distance transport of heavy bulky minerals to be cost effective. Improvements in ship design, wharf handling procedures and equipment further reduced rates from 1908.

The rapid spread of the railway was the other major transport development. It had a two way influence in that the construction of the rail brought an unprecedented demand for minerals while at the same time opening up new regions as participants in the new broader economic relations. When sea transport was predominant only those locations with a good port access could compete in the world economy. The railways brought new areas into the system and made marginal areas profitable. The growth of the railways is exemplified by the length of track in use at any period. In 1830 only 329 km of track were laid worldwide. By 1850 this had increased to 37 805 km. In the second half of the century railways expanded even faster so that by 1890 some 597 971 km had been laid.[4]

Overall, the cheapening and speeding up of the movement of goods and people through improved transport and communications played a vital role in the growth of the world economy in these years. By promoting the exchange of a growing volume of goods; by expanding markets; by permitting the concentration of certain types of production in fewer centres which allowed specialisation and economies of scale; and by allowing greater flow of capital and labour, the new forms of transport and communications made possible the growing economic interdependence of the whole world which is a major feature of the nineteenth-century economic development.

The early history of Tasmania (Van Diemans Land) is well known to be influenced by the convict system. It was connected to the earlier phases of the world economy as a producer of wool and timber exports and as a recipient of the unwanted elements of the population of Britain. The growth of the local economy was slow but regular until the depression of the 1840s. Wealth was concentrated in the hands of the landed class who had been given their land by grant. Over 809,400 ha or 12% of Tasmania was given away in the period up to 1831 when free land grants ceased. The landscape today is scattered with reminders of the wealth of this landed class and their access to cheap labour. The stately Georgian mansions, extensive solid outbuildings and living fences which enclose holdings serve to denote the extent of this settlement.[5]

Southeastern Tasmania and the Midlands as well as the area around Launceston in the north were well placed to participate in this economy with excellent ports located near lightly forested land suitable for sheep grazing and wheat production. A cheap supply of labour and the land grant system kept the land holders production costs low which counteracted the high transportation costs from such a distant place. The British Government supplied capital in the form of supporting the convict system as well as erecting a number of public buildings especially in Hobart. Little capital was attracted to the colony for anything other than wool production, the most notable of these being the Van Diemans Land Company.

The first part of the nineteenth-century saw the growth of some internal capital based around the large estates. A number of town based industries developed to supply and service the large estates and government facilities and these are particularly important for the capital investment of the later part of the century. Convict labour gave the competitive edge to the colony, first as direct labour in the agriculture and timber industries and later indirectly through the construction of the roads and bridges of the transport infrastructure which expanded the settled districts.

By contrast, the northeast of the state attracted little attention in this period as the vast forests, difficult terrain and few places suitable for port development left the region outside an economic system based on wool and wheat production in the north and midlands and timber harvesting in the south.

The discovery of gold in Victoria had disastrous effects for the most part in Tasmania. Population growth in Tasmania was slow and the largest proportion were, or had been, convicts. With notable exceptions, the ex-convicts found themselves working as low paid labourers.[6] It is not surprising that over half of the adult male population crossed Bass Strait when gold was found in the mainland colonies. Tasmania's economic and political systems offered little future. Tasmania which had been climbing slowly out of the depression of the 1840s had a labour shortage from this time and the Depression continued as the other colonies began to prosper. Some entrepreneurs profited from the proximity of the Victorian goldfields and the prosperity of Melbourne. Timber production, particularly sawn timber for housing, increased at this time. Large sawmills and long tramway systems were built to serve the demand.[7]

For a short time Tasmania became the food basket for Victoria until the production of food in that colony rose dramatically and came into direct competition with the same goods as Tasmania was producing.[8] Less obviously, but more important for the beginnings of the mineral boom in Tasmania, some men returned from the goldfields experienced in recognising gold bearing deposits and indeed some already knew where to look. The search for payable mineral fields began in earnest. The results were impressive. By 1900 minerals accounted for almost half of the export earnings. Contributions were made from tin, gold copper, iron, asbestos, silver, lead, molybdenum, oil shale and slate. It was the earnings from these minerals that led to prosperous times for the colony especially from the late 1870s to the early 1890s.

MINING HISTORY OVERVIEW

This paper can only outline the major developments in the mining industry in Tasmania. The Aboriginal population had long made use of ochre deposits and mined them in earnest at favourite locations such as Toolumbunner where long trenches and adits exposing underground mining are still in evidence.[9] The earliest discoveries by

the European settlement were of coal at the Tasman Peninsula and at Jerusalem (now Colebrook). However these deposits were mined almost entirely for local domestic consumption.[10] It was the discovery of gold at Mangana in 1852 where a short lived gold rush ensued that interest in mining increased throughout the colony. But although there were minor rushes in the 1850s and 1860s at Waterhouse, Lyndhurst, Mathinna as well as Mangana it was not until the deposits at Nine Mile Springs (later Lefroy) and Beaconsfield, the lodes at Mathinna and the great rush at Lisle that gold mining had any real place in the Tasmanian economy.[11] Gold was not to prove plentiful in Tasmania with the alluvial fields being worked out after only a few seasons and the deep underground mines proving a difficult way to make profits as production costs were continually high for a variety of reasons.[12]

While gold was attracting much of the attention of investors, Philosopher Smith discovered tin at Mt Bischoff in northwest Tasmania in 1871.[13] This discovery injected capital into the hands of the Launceston shareholders who began to receive large dividends from 1873. With much optimism and a fair amount of capital, the search for further tin supplies began. In the northeast George Renison Bell discovered the rich supplies on the Boobyalla River in 1874 while at about the same time finds were made at Georges Bay (St Helen's) and Thomas' Plains (Weldborough) and soon the northeast was dotted with tin mines.[14]

Small quantities of tin are essential in a wide range of industrial processes. Pure tin is used as foil and for the production of collapsible tubes and for pipes in manufacturing beer, chemicals etc. The most common use is in the manufacture of tin plate for the food canning industry which had been perfected by the 1850s. Tin is extensively used as solder in the machine industry and was needed for the manufacture of railway rolling stock and marine engines.

The tin market has always been highly volatile with major price fluctuations over short periods. Yates explains:[15]

> Tin is such an expensive commodity that no producer holds more than a few hundred tons: nor do consumers worry about holding stocks since to most of them tin is... immaterial to the price of the articles they manufacture. Hence any quite small change in demand or a rumour of some change in supplies will have an utterly disproportionate influence on price movements but overall what determines the price of tin is the general level of prosperity.

This means that even in prosperous years the price of tin varies considerably. In 1884 for example the price per ton in London at the start of the year was about 85 pounds dropping to a low in October of 73 pounds 10 shillings before ending the year at 75 pounds per ton.[16]

Tasmania was one of the major suppliers of tin accounting for 18% of world production in the 1880s. The Straits Settlement (Malaysia), a British colony at the time, accounted for the bulk of the tin production with 62% coming from these mines. In effect this gave the British a monopoly on tin production; an advantage which they exploited fully by ensuring that the London tin exchange set the prices.

Coal mining began in the region in 1864 but continued only intermittently until 1886 when the rail was built through to the Fingal Valley. It has continued without interruption to this day although the replacement of the steam trains for diesel saw the closure of many mines. Unlike the fields in New South Wales and Victoria the coal has not been used for electricity generation as the cheaper and cleaner option of hydro power has been utilised. Local industry has always absorbed most of the coal and it is used today in the manufacture of paper.

Iron ore was mined from 1872 when shortages in the Victorian market were caused by the Franco-Prussian war. These ventures were not successful and were short lived although large amounts of capital were expended setting up ports, mines, tramways and blast furnaces. The furnaces closed when the iron produced was unmalleable due to high chrome content.[17]

THE REGION

Northeast Tasmania is defined for the purposes of this study as that area east from the Tamar River to the east coast, north to the coast and south to the St Paul's River Valley. Within this, the study concentrates on the land which is currently forested and thus excludes the broad fertile river valleys and the rich volcanic hills which form the modern agricultural lands.

The terrain is generally rugged with relatively little soil development. Altitudes of up to 800 metres are found with the average over 400 metres. The forests are predominantly open dry sclerophyll although some areas of rainforest were known at higher altitudes. It is an area of winter-spring rainfall with relatively dry summers. Several large rivers drain the region with the South Esk being the major west-flowing system and the Ringarooma being the major north-flowing system.

The geology is complex and only the economic geology is presented here. The primary deposits of metallic mineral are connected with the emplacement of the granite porphyries of Devonian age. The Cambrian-Ordovician Mathinna series contains the auriferous quartz reefs, the tungsten lodes of the Story's Creek district and the tin, copper and tungsten lodes of the Scamander district. The coal seams occur in the Permo-Carboniferous and the Triassic systems while the oil shales are confined to the granites. The Tertiary freshwater sediments in mineral districts are often overlain by Pliocene basalt and form sub-basaltic systems of deep leads. The most important of these is the Ringarooma valley with occurrences at the George and Musselroe rivers and at Back Creek and Lefroy. Of the Holocene deposits the extensive alluvial deposits along the streams and rivers often contain valuable metals and minerals. This is the case for the alluvial tin fields centred on the Ringarooma and the streams which feed it while alluvial gold was mined from the waterways at Lisle, Mangana, Mathinna, Alberton, Lefroy and Back Creek[18].

The study area was settled by agriculturalists, mainly small farmers who had taken up land after Scott had returned with the discovery of rich soils which lay beneath the tall forests which blanketed the area. The discovery of the effectiveness of ring barking meant that the forests could be cleared and small farms developed. Many of the farmers were recent immigrants who had little capital and for the first few years they produced little more than they consumed. The settlement of the area was handicapped by the poor ports and extremely bad roads, often inaccessible in winter, which linked the settled areas to the ports. There were no powerful spokesmen in the Parliament to put the case of these small farmers and these conditions prevailed for many years. The population in the district continued to grow until there were about 7,000 persons by 1870.[19]

THE REGIONAL APPROACH

The area under study is extremely large, much larger than is usually considered in historical archaeology. It encompasses an area approximately 100 km east-west and 160 km north to south. The currently forested land comprises approximately 60% of the region. The focus of the study is justified on the basis that their history is different to their agricultural neighbours. The emphasis on forested land excludes the more successful mining towns such as Derby and Beaconsfield where mining continued into this century and which have found a continuing role as towns after their mining finished. The remainder of the mining sites are found on land that is currently forested, an indication of the length of time since they ceased to have a functioning role in the region. This desertion has left a rich archaeological record of the industrial history of northeast Tasmania.

A cultural landscape approach has been attempted by several researchers who concentrated on agricultural districts or urban areas.[20] The definitions of what constitutes a cultural landscape basically defines an ecological approach. For example, Taylor[21] states that:

> cultural landscapes are rural and urban settings that people have settled and altered through time. They include cultural and natural elements of the ordinary, familiar, everyday landscape.

and he goes on to include other definitions which state that a cultural landscape is

> a geographic area, including both cultural and natural resources including the wildlife or domestic animals therein, that has been influenced by or reflects human activity or was the background for an event or person in history.

There seems to be an implicit acceptance in this approach that only the present landscape needs to be discussed and that the series of landscapes which have been involved in creating these are not generally elaborated on. If used in this way, the approach is essentially a static one as although it may identify phases from which components have survived, it does not identify, describe and analyse prior land use systems. If the concepts of the cultural landscape approach were to be combined with the stage of development, it could be used to gain a diachronic picture of the development of the region. Mapping of the sites in a chronological system should allow for furthering our understanding of the evolution of the landscape.

An ecological approach is extremely complex in that a large number of interrelated variables are involved. This is compounded when the study area encompasses a region. Some preliminary working parameters need to be identified here in order to form the basis upon which the methodology was determined. Given that the study area is, by and large, made up of those lands which are unsuitable for agricultural purposes, the motive behind its use centres around making profits from the exploitation of the available raw materials; minerals and timber.

At the first level, an exploitable resource must exist and must be known to exist. With the benefit of hindsight and over one hundred years of geological and forest type mapping, the distribution of mineral zones and harvestable timber are well known and can assist in establishing the likely extent of use of the area.

The availability of a resource does not in itself dictate that it will be exploited. It must also be potentially profit making. The amount of capital expenditure and labour expended in its extraction should not exceed the prices obtained in the market for the product. This capital may well come from outside the study area but labour will be enacted upon the landscape.

The costs involved in transporting the product to market were significant for the raw materials of northeast Tasmania. Accessibility in terms of pack tracks, roads, tramways into industrial areas and ports, bridges roads and later railways into the region as a whole dictate the nature of exploitation. Many of these are now archaeological sites and are important in determining the nature of land use.

The extraction of the resources requires a number of other essential commodities. Water to drive machinery, to separate mineral from matrix, to remove sawdust from sawmills, to fill steam engines and for domestic use was one such requirement which could dictate the nature of use of available resources. The availability of water could dictate which resources could be exploited, where industrial sites may be located or influence the profitability of extraction by necessitating the construction of dams and water races. Alternatively, too much water could close down mines due to flooding at lower levels.

Labour is one of the more important factors in the equation. The men who worked the mines or who felled trees or worked at the sawmill had to be adequately rewarded for employment outside the settled districts. They also had to be housed and provisioned with adequate supplies for their needs. Evidence of these domestic areas can inform us of changing conditions as well as address questions of gender and ethnicity. Away from industrial site complexes nodes of settlement may be expected to service those who worked directly in raw material extraction.

All these factors are highly variable and subject to change through time. Changes may occur rapidly as when a mine ceases operation or they may occur more slowly as with the development of better roads. It is this volatility which has left the archaeological evidence on which the history of the region may be better understood. The brief outline of the parameters involved needs to be more fully described and this is one of the aims of this project and must await its completion.

METHODOLOGY

The Inventory

The first stage in this approach is to identify the historical archaeological resource base by the creation of a site inventory. This was accomplished in the course of a project for the Forestry Commission Tasmania funded by a National Estate grant.[22] Oral informants who were predominantly current forestry workers and written accounts such as government records especially Department of Mines records and local histories as well as field inspection and recording provided the data for the inventory.

There are a number of problems in attaching too much importance to an inventory which has not been compiled from field work which used standardised sampling strategies. Firstly there is no way of checking the accuracy of the descriptions provided by the sources. Although the information was cross checked between sources when possible, it is clear nevertheless that the inventory is biased to the biggest, best or most unusual while the mundane is underrepresented. Underestimation of the smaller alluvial fields and sawdust heaps was expected and this has been verified by the later work of Kostoglou who in a detailed study of a small area around Mt Horror managed to double the number of timber industry sites.[23] Similarly, the relatively small area

Table 1: A system of site definition based on archaeological site recording.

EARLY PHASE			
	Little Capital	**Some Capital**	**Large Capital**
Extractive elements	Alluvial Mines. Small shaft mines. Choice of adit-tunnel methods over deep shafts Small tailing heaps. Pock-marked lunar lanscapes.	Alluvial mines. Deep shafts with winding gear. Adit tunnels in association with shafts. Long water races, multiple races, hand dug and timber flumed. Medium tailing heaps.	Large alluvial, quarries with many faces. Deep shafts connected to adit-tunnel systems on many levels. Shafts with winding gear, steam powered. Long water races, dams, well engineered hand-dug stone lined as well as wooden flumed sections.
Processing elements	Sluicing, wooden cradles and tail races.	May include puddling, batteries, retorts and complicated sluice box systems and tail races.	Separation of mine and processing areas. Complicated processing systems including puddling, complicated sluice systems, retorts, batteries water or steam powered.
Material remains	Little or no equipment/use of local materials especially wood, stone and earth. Little evidence of dwellings bottles, ceramics.	Some introduced material including metals. Evidence of dwellings, usually wooden, stone/earthern chimney butts. Daffodils. Pack tracks.	Housing in evidence often with some status/size differences. Bricks, stone and wood all used. Bottles, metal, glass of many kinds. Daffodils. Pack tracks.
Geographical location	Proximity to existing communication networks. Sometimes inappropriate geological locations. Large regrowth forest.	Close to existing communication networks. Sometimes in inappropriate geological locations. Large regrowth forest.	Usually well located geographically. Integration of roads, piers, tramways with mine and processing. Large regrowth forest.

LATER PHASE			
	Little Capital	**Some Capital**	**Large Capital**
Extractive elements	As for early phase.	Large alluvial areas stripped with many faces. Deep shafts, adits and tunnels with winzes connecting many levels. Petrol or steam powered winches for shafts. Long water races well engineered, hand dug, stone and concrete sections with long flumes and complicated siphons. Large dams. Large tailings heaps.	Large areas of alluvial mining stripped by mechanical means. Large water races often from major rivers. Large dams, weirs. Deep shafts, multi-layered, well engineered. Airshafts, pumping stations. Vast tailing heaps. Mine closely interrelated with processing.
Processing elements	As for early phase Petrol powered crushers.	Hydraulic sluicing.Machinery sheds with concrete engine mounts. Well designed processing sheds using gravity.	Mechanically connected to mine by aerial tramways, conveyor belts, tramways. Often more than one mine output to processing. Large well designed sheds using machinery powered by petrol or electricity. Facilities for workers, change rooms, showers.
Material remains	Greater use of corrugated iron, tin cans. Dwellings often with corrugated iron chimney. Machined nails. Greater quantity of rubbish. Bottles, generally local produce. Exotic bulbs.	Use of iron, metal pipes, bricks, concrete. Housing in evidence often status differences. Services available, eg stores, hotels. Bottles, tin cans recognisable. Rubbish heaps. Exotic trees, shrubs and bulbs.	Townships complete with roads and services. Clear separation of management and labour evidenced by position and quality of construction. Rubbish tips. Large amounts of metal, brick, concrete, bottle debris. Exotic trees, shrubs and bulbs.

encompassed by the Lisle-Denison goldfields which have only five entires on the regional inventory were studied in detail over a nine month period by Coroneos who has listed over 90 separate sites.[24] This outcome appears to be inevitable and will be difficult to redress on the scale of this project which rather than detailing every site attempts to profile a region.

The definition of what constitutes a site tends to depend on the source of the evidence. It would be foolish to place too much importance on the frequency of various site numbers as it is highly likely that some informants and researchers will lump together sites while others will list features as separate sites.[25]

Site Recording

This is the most critical stage in the process and the categories devised here need to be fully explicated. While all recording of the archaeological sites should be as complete as possible it is still possible to undertake this basic recording within a format which will address the question at hand. As the question involves the relationship between the development of the region and the various industries within, the site recording needs to be based on gaining data which will be relevant to this. In order to do this a series of expectations have been drawn up based on the expenditure of capital and the perceived chronology of production. Those which relate to the mining industry are presented in some detail in Table 1 as an example of the methodology employed.

RESULTS

It needs to be emphasised here that this work is in progress and these results are preliminary. The inventory stage is almost completed and most sites have been recorded. Analysis of the results is still in progress.

The Inventory

There are 447 historic sites recorded in the forested areas of northeast Tasmania. These fall into three categories (Table 2).

The mining heritage of the region is clearly indicated by these figures with nearly 60% of all sites being classified as part of this industry. A further breakdown of the components of this adds to our understanding of the nature of the industry (Table 3). Encompassed in the figures are the extraction and processing sites, the water races that supplied water to the mines and the dams that were constructed. It includes the tracks that were relatively exclusive to the mines in that their only purpose was to serve them. This category is vastly under represented as many olds track have become part of the modern road and forestry track system and as such have not been listed. The towns, huts and stores which served the miners have also been listed and it is likely that these too are under represented.

Figure 1 shows the distribution of the sites. The widespread distribution over the region show that mining activities have played a part in most areas over time rather than being concentrated into one small district. They follow fairly closely, as may be expected, the relevant geological outcrops and those streams which discharge from them.

Tin mines are the most numerous site in the region. The mines are a fairly even mix of alluvial and deep lode types although the alluvial mines obviously cover a much larger area. In the tin mining districts every creek and river has been mined using alluvial methods. The landscape is disturbed over the lower slopes of river and creek valleys with small, shallow holes, trenches and the occasional deeper quarry. Lode mining is concentrated

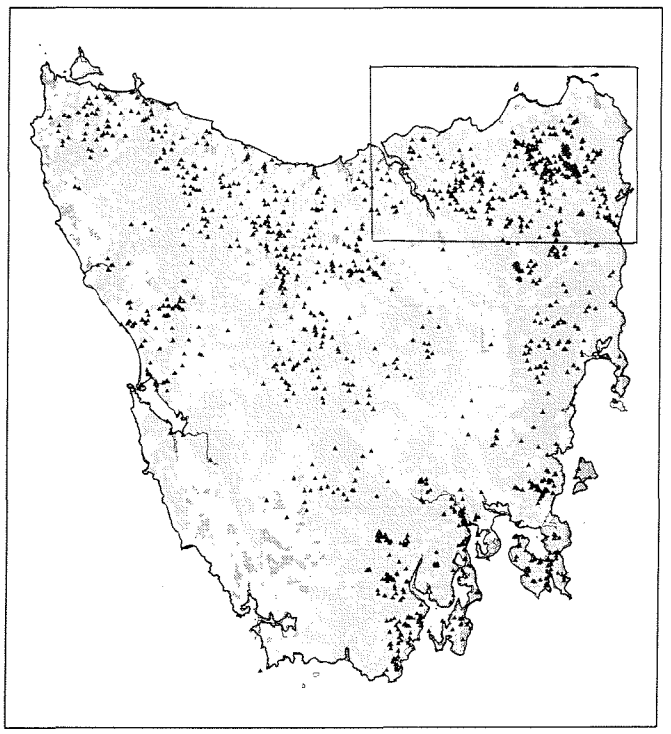

Fig. 1: Northeast Tasmania. Distribution of historic sites on forested land (courtesy of Forestry Tasmania).

into fewer area especially around the Blue Tier, Derby, Mt Paris and Story's Creek-Rossarden. This type of mining requires a greater amount of machinery to gain the ore and in the processing and hence a greater amount of cultural material is associated with this mining type. In contrast, the alluvial mines may often have very little machinery with the only remaining evidence the ground disturbances themselves.

Gold mining is also shown to be important in the region. These sites show a similar pattern of distribution to tin in that they are centralised into the major fields. Unlike tin, however, prospects are sometimes found at some distance from the major outcrops; a vain search for the mother lode. The mixture of alluvial and lode mining is also noticeable here with alluvial mining concentrated in the areas of Lefroy, Back Creek, Lisle and Waterhouse. Lode mining often is a second stage of mining at any location that occurred at most of the listed places as well as at Beaconsfield, Mt Horror, Alberton, Golconda, Denison, Mathinna and Tower Hill.

The range of other mines is not discussed in detail here. All are hard rock mines that are distributed across the mineralised regions. Other than coal mines which are still operating at Fingal none were long lived although they made some contribution to the development of the region and emphasised its importance as a mineral rich area. They highlight also the level of prospecting that must have been undertaken in the late nineteenth century as no new fields have been exploited since that time.

The chronology of use of these sites has been difficult to establish but preliminary assessments suggest that 64 sites were used earlier than 1890 and are classified as early sites, 41 sites are older than 1890 and are classified as late while the majority of sites have not yet been classified.

The importance of the timber industry to the region is highlighted by the 136 (30%) sites which fall into this category. Table 4 summarises the types of site associated with this industry.

Table 2. Categories of sites on inventory

SiteType	Number	Frequency %
Mining	264	59
Forestry	136	30
Settlement	47	11
Total	447	100

Table 3. Types of mining sites on Inventory

SiteTypes	Number	Frequency %
Extraction/Processing Sites		
Tin	102	50
Gold	70	35
Silver, lead copper	8	4
Coal	4	2
Tungsten/Wolfram	5	2.4
Slate	3	1.5
Asbestos	2	1
Iron	2	1
Lime	1	0.5
Uranium	1	0.5
Ochre	1	0.5
Total mine sites	**199**	
Other site types		
Water races	22	8.3
Dams	12	4.6
Tracks	6	2.3
Hydro power station	1	0.5
Tin dredge	1	0.5
Towns /settlements		
associated with tin	18	6.8
" " gold	2	0.75
" " Chinese	4	1.5
Total associated features	**66**	
Total mining sites	**265**	

Sawmills are the predominant forestry site recorded on the inventory. This is probably because they are the most noticeable site associated with the industry. Their distribution coincides with the forests which remained after all the most suitable agricultural lands had been taken up by the early settlers. Although the rich basalt soils had had the best timber on them, the early settlers had no market for this timber and it was ring barked and burnt in order to clear the land for crops. The sawmills show a distribution which reflects the ability to move the product to market and hence there is a concentration near the city of Launceston or close to port or rail transport. This was an intrinsic feature of this industry which had to cope with transporting a heavy product to markets. It is only with the advent of large trucks and a heavy investment in road construction that mills have become centralised in population centres.

The few tramways recorded are clearly an under estimate of the actual number which must have been constructed. All early mills had tramway systems radiating out into the forests to bring in the felled trees. Many of these were destroyed by later regrowth and second rotation harvesting. Others which were more ephemeral may still be visible in the forests but will require detailed mapping to locate. Tramways, log haulers and trees with scars are the only artefacts which have been listed away from the mills. The largest artefact class is, of course, the stumps remaining after felling. Although it would be an interesting exercise to record these the magnitude of the problem meant that it has not been undertaken.

Table 4. Forest Industry Sites

Type of site	Number
Sawmills	113
Tramways	6
Log haulers	1
Mill/town complexes	6
Camps	3
Arboreta	3
Modified trees	2
Memorials/ Monuments	2
Total	136

Table 5. General Settlement Sites

Type of Site	Number
Farms	14
Huts	11
Roads	9
Schools	4
Survey cairns	2
Towns	1
Radio Transmitter	1
Picnic ground	1
Stone walls	1
Rock carvings	1
Pig oven	1
Graves	1
Total	47

The need to house timber industry workers in the bush is apparent in the number of towns and huts that were located near the mills. This aspect of the industry is well worth further analysis as it appears that there was a variety of accommodation provided from the rude bush huts to house single men through to company towns complete with schools, shops and halls. This way of life has been superseded with the improvement in road transport and the centralising in population centres.

Of some interest is the attempts at experimentation with improving the forest resource. A number of arboreta with a range of tree species were planted from the 1920s. Some of these are still monitored for growth and condition today but most have fallen into decay. They show an increasing awareness of the Tasmanian Government of the need to improve, manage and plant timber resources.

Another sign of the importance of this industry is the memorial groves and monuments placed in the bush to commemorate the activities of government forestry rangers.

Farms are the largest category in the general settlement sites (Table 5) and these are fairly randomly spread across the region. These attest to the optimism of the would be farmers and many are known to be failed soldier settlement farms which were on marginal land. These properties were subsequently purchased by the government for forestry purposes. Some of the schools and roads were built to cater for these districts and became redundant as the land use changed.

Many of the huts are likely to be associated with the timber and mining industries but in the above cases this relationship was not apparent. Others are likely to be shelter for the seasonal hunters and snarers who trapped for wallaby and possum skins. These are found dotted across the region and need further investigation as little is known of these activities in the north-east. The area around the Mersey River is known to have been important for such activities[26] and there appears to be no reason why this region should not have had a similar industry.

Of some interest are the two stone cairns which have been in use for over one hundred years as survey reference points. All titles, leases and the like owe their boundaries to the triangulations made from these cairns.

Site Survey

Only 22% of sites listed in the inventory have so far been recorded in the field. The discussion provided here should therefore be treated with some caution. The sites discussed are used as examples of how the methodology outlined above can be used to address the question of the relevance of the world economic systems to the empirical field data. The nature of the available data and how it can be approached is presented. All sites discussed are mining sites.

Early, little capital

Panama Creek is an example of an area which has been placed in this category. The remains here are of shafts and adit or tunnel mines. The valley is an inappropriate location for the recovery of gold. Little is known of the history of this field but it is thought to have operated in the 1870's when miners were attracted by the apparent quality of the quartz reefs. The area has approximately 30 shafts which average between 5-10 metres deep. There is no evidence of poppet heads above these shafts which are usually surrounded by mullock heaps. Few material remains were recorded on the surface.

Efforts of the miners seem to have been concentrated on the search for the 'mother lode'. One adit, the New Panama, appears to have had the greatest attention as the associated mullock heaps measure 30 x 6 x 5 metres. Some underground recording revealed that all the tunnels and shafts were hand dug with little in the way of timber supports. The tunnels often decreased in size with distance from the entrance. No doorways were in evidence at the entrance.

Remains of dwellings in the area is slight. One small scatter of glass associated with a stone hearth provides the only evidence of the early mining phase.[27]

Plate 1: View to the Moon Tin Mine, Blue Tier, 1992

Plate 2: View over Paimena township, 1992

Early, some capital

The Blue Tier is an extremely complicated tin field which was in use from 1874. The first phases concentrated on the extremely rich alluvial deposits. Evidence of this can be seen in the large amounts of topsoil that have been stripped from the surface. The lode mining began in 1876. The remains of this are evident in the large quarries that are associated with the mines. The Full Moon mine shows evidence of water diversion channels, a quarry area covering approximately 300 x 100 metres with trenching between them. A pack track connects the mine to the town site and a small bridge crossed over the stream next to the battery. There is a five-head battery on the site and a steam boiler which powered it although these are certainly later additions to the site (see Plate1). There is practically no tailings heap suggesting that all the ore was crushed. Some of the larger mullock lies near the battery. The town of Poimena which served a number of such mines is about 500 metres distant. The remains of this are all now sub-surface but the outlines of several structures including the school are still visible (see Plate 2).[28]

Early, large capital

The Sir John Franklin gold mine operated near Back Creek operating from 1879 to 1884. Evidence remains today of two shafts and an adit or tunnel system. Underground these join up in a series of winzes to three levels. The mine is well engineered with good sized tunnels, well constructed with timber supports. The entrance had a substantial door. Evidence of winding gear can be seen near the main shaft. This was mounted on a stone machine base and was apparently powered by a steam engine as another machine base is adjacent to this. Processing of the ore took place near the adit. A furnace was built into a shed built constructed wood with a slate roof which has collapsed. A slate lined flue went from the shed up the side of the ridge to the top. Very little machinery or metal survives on the site and the habitation areas have not been located. There was virtually no tailings near the site.

Late, little capital

Gipps Creek was the scene of a number of small tin mines operating mainly in the early years of the twentieth century. The mines were essentially alluvial and concentrated in the creek area. The creek has been sluiced for a distance of 150 metres and the original course obliterated. The water now meanders around mullock heaps which are often aligned at right angles to the flow. These piles of overburden dominate the landscape today as although not high, averaging only 1-2 metres and usually only several metres long, they number in the hundreds. The attempt to find the lode is evidenced by several adits some 150-200 metres up the valley sides.

Water was provided from Cradle Creek where a small dam and a water race meander to the Gipps Creek field. The remains of four houses were recorded. These had stone chimney bases and corrugated iron chimneys and roofs. Metal pipes and other metal fragments abound on the mined areas. Rubbish consisting of broken bottles, corrugated iron, tin cans, broken prams and wire beds littered the habitation area.

Late, some capital

The Kent or Chintok tin mine was the best preserved site in the region until the machinery components were

removed by the Beaconsfield Museum in 1993. The site was largely destroyed by the heavy machinery used to remove these components.

The source of the ore-bearing rock has not been located due to thick undergrowth but the area is rich in tin deposits. There was a water race from the Wyniford River approximately 2 km distant and a benched track led into the mine from the main Wyniford track. Most significant was the 10-head battery in mint condition and the water wheel which drove it (see Plate 3). The race which provided water to the wheel is still clear. No tailings were seen at the site.

At a distance of 30 metres from the battery there are the footings of four structures. These were small, measuring 3 metres x 3 metres, and each had a stone chimney butt and a corrugated iron chimney. One of the dwellings had two chimneys and was slightly larger. A structure interpreted as a toilet was located 10 metres from the house foundations.

This site was in an extremely remote location and the effort involved to bring in the heavy machinery, presumably drawn by bullocks, attest to the availability of some capital.

Late, large capital

There are many examples which could be used to illustrate this type of mine. The Briseis race provides one. This race provided the water for the tin mine at Derby. It was built in 1899-1890 at a cost of 67,500 pounds to bring water from the Ringarooma River 42 km to the mine. It is mainly an earthen structure but there were over 7 km of fluming through difficult sections and two siphons across creek valleys. The remains have been traced in several locations and the effort involved in the formation of the race can be documented. The construction of such a large race is a good example of a massive amount of expenditure required prior to any return from the mine and could only be undertaken by companies or individuals with capital to risk.

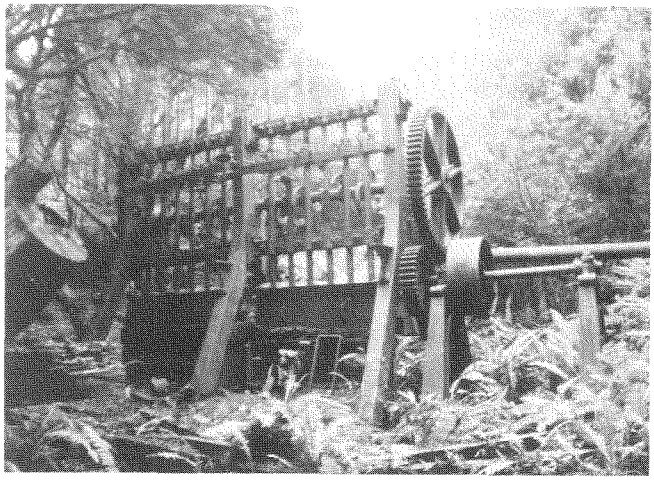

Plate 3:The Kent (Chintok) tin battery prior to removal, 1990

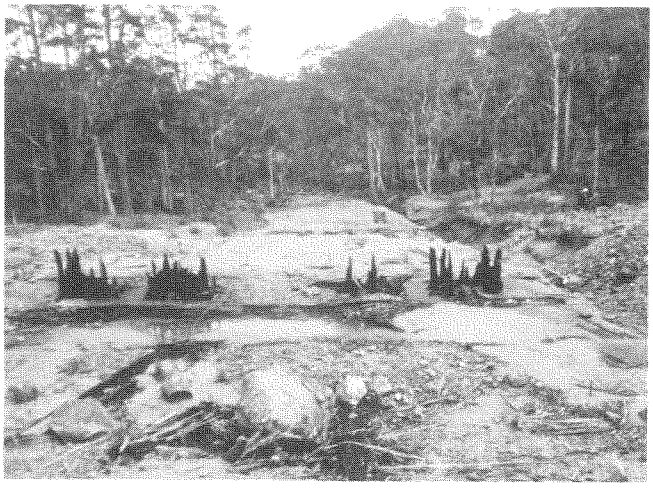

Plate 4:Plate 4. Mt Rex tin mine processing area, 1990

Mt Rex tin mine provides another example of the large expenditure of capital. The mine was first worked for silver in 1891-1893 but was later mined for the tin ore. It was a large underground mine. Before the ore could be retrieved and processed a new company was floated in 1900 which raised the capital to build two dams and a water race. As the ground that it traversed was extremely rocky, kilometres of fluming and underground tunnelling were required. At the mine site itself large poppet heads for access to the underground workings were constructed as well as a number of processing sheds the largest of which measures over 150 metres and was on four levels to use gravity in the processing stages (see Plate 4). A large boiler house with thousands of firebricks was constructed adjacent to the shed. The building appears to have been constructed in corrugated iron over a wooden frame while concrete and bricks were also used apparently as machine mounts for equipment in the shed. The foundations of a number of houses are still visible. One is clearly better built than the others with up to six rooms, three chimneys and a liberal use of bricks. It is also spatially separate from the others. The site is reasonably remote and the company built two roads into the mine which were well enough constructed so as to be useable today.

DISCUSSION

The preliminary results have furthered our understanding of the development of the region. The distribution and number of sites indicates the extent to which the area was used in the past. It is clear that mining has contributed much to the development of the modern landscape. It also has shown the importance of the timber industry to the region and highlighted those forests which have long supplied timber to the market place. It should not be thought that these aspects of the history of the region are well known either by students of the history of Tasmania or by the public. Rather, much of the mining and timber history of the region has been lost and would be dominated by the richer or more recent activities without the use of archaeological methods.

The preliminary results seem to indicate that the approach has potential. The inventory has highlighted the extent to which the forests were used in the past and further analysis and field checking of these data should allow a greater understanding of the regional history. It has also allowed for the nature of the historic land use patterns to be identified and established the industries which operated through time. Importantly it has set up a data base from which further questions could be asked of the evidence.

The question of the relationship between the state of the world economy and the development of the region needs to be explored in more detail but the approach as outlined here holds some potential. It is only by analysing the raw data in such a framework that the broader historical questions can be addressed from archaeological data. Further work in the area is being undertaken so as to develop the analytical framework and to assess the validity of the approach.

NOTES

1. Kenwood and Lougheed 1983:13-14.
2. ibid:23.
3. Stowers 1958.
4. Johnson 1892.
5. see Tassell 1988.
6. Robson 1985:30.
7. Morris Nunn and Tassell 1984.
8. Johnson 1892.
9. Gaughwin 1993.
10. Bacon and Banks 1989.
11. Townrow 1986.
12. Coroneos 1993.
13. Robson 1985.
14. Gaughwin 1991.
15. Yates 1943:143.
16. *The Examiner* 1884.
17. Morris Nunn and Tassell 1984; Jack and Cremin 1994.
18. Nye and Blake 1938:57.
19. Loone 1981; Newitt 1988.
20. eg Tassell 1988; Taylor 1989; Jeans 1984.
21. Taylor 1989:16.
22. Gaughwin 1991.
23. Kostoglou 1992.
24. Coroneos 1993.
25. see Ritchie 1991 for full discussion.
26. Cubit 1987.
27. Coroneos 1993:42.
28. The Blue Tier is currently under detailed investigation by Greg Jackman, a consultant to Forestry Tasmania.

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