Estimating Agricultural Productivity in Mysore and South Canara from Buchanan’s Journey (1800–01)

Positioning India in the Great Divergence Debate

SASHI SIVRAMKRISHNA

In 1800 and 1801 Francis Buchanan conducted one of the first agricultural surveys in the erstwhile Mysore state and its adjoining regions. By subjecting data contained in his survey to rigorous analytical study, estimates of agricultural productivity in terms of per capita grain output for two regions in Southern India; the erstwhile Mysore state and South Canara district can be obtained. Given that reliable estimates of agricultural productivity for the pre-1800 period outside of North-West Europe are relatively sparse, the present study adds to the archive of known estimates of agricultural productivity so as to enable comparative studies of economic performance. Moreover, since agricultural productivity had a direct bearing on the standard of living in medieval and early modern economies, the findings of this paper have important implications for India’s position in the Great Divergence debate.

Introduction

The objective of this paper is to estimate agricultural productivity in terms of per capita grain output in the erstwhile Mysore state and South Canara district, Southern India, from the qualitative and quantitative data contained in Francis Buchanan’s Journey of 1800–01.1 Estimation of agricultural productivity is not only central to understanding the economic development of a country or region from a historical perspective but can also help ascertain when the growth paths of the West and Asia began to diverge. More precise estimates on when the divergence began is critical in validating any hypothesis on the causes of or why this divergence. Given the sparsity and nature of Asian data used in initial studies, the conclusions drawn have been contested in what has come to be known as the Great Divergence debate.

Early studies of the Great Divergence using backward projections to derive gross domestic product (GDP) per capita estimates claimed that the superiority of Europe and the West began long before the Industrial Revolution (Kuznets 1965; Zimmerman 1962) due to deep structural advantages like race, class and institutions (Landes 1998; Alam 2006). In subsequent studies based on real wage data for European and Asian countries, Allen (2005, 2008); Allen et al (2007) and Broadberry and Gupta (2006) support this claim, categorically asserting that Europe had higher standards of living than Asia anywhere between 50 and 300 years before 1800 (Allen 2008). This dominant view has, however, been challenged by several historians collectively known as the revisionist or California School who locate the timing of the Great Divergence to post-1800.2

Where does India stand in this debate? In one of the first revisionist studies pertaining to India, Parthasarathi (1998) showed that regions or countries with low (silver) wages were able to attain higher standards of living or in other words, higher real wages, from relatively low priced foodgrains. This became a key counterargument to the dominant view which had until then not considered the effect of agricultural productivity on standards of living. Parthasarathi, however, had focused predominantly on weavers in his study. This allowed Allen (2005) and Anne Booth (2006) to dismiss his results as being of limited usefulness in drawing comparisons in overall standards of living between England and India. In an effort to overcome this limitation, Sivramkrishna (2009) constructed
an “aggregate welfare ratio” using primary data collected by Buchanan (1807) and concluded that living standards in erstwhile Mysore, may have been close to the most advanced parts of Europe at the turn of the 19th century and on the eve of colonial intervention in this region. In particular, the study threw up a surprising result that on average the real wages in Mysore were as high as 4.7 ragi baskets, each basket being defined with a grain component of 500 gm, 100 gm of lentils, 10 gm of oil and some cloth. Qualitative data drawn from Buchanan also pointed out that working labourers were supposed to and may have actually consumed significantly higher quantities of foodgrains, perhaps in the region of 1.2 kg to even 2 kg per capita per day. While this and other revisionist studies argue that the divergence has to be located in the late 18th or first half of the 19th century and not prior to the industrial revolution and colonisation, concerns still remain over the capability of the region to have such a high grain output available for consumption given the fact that it may not have been a major exporter of any particular commodity (and importer of grain). It is therefore crucial to estimate agricultural productivity at a regional level to strengthen the claims of the revisionists. At the same time, the importance of measuring agricultural productivity goes beyond the Great Divergence debate, providing us with important insights into the process of economic development in general, including:

1. Basic nutrient availability to the population at a point of time using per capita production of foodgrains as a proxy for per capita grain available for consumption.
2. A high level of agricultural productivity, especially output on per capita basis, implies existence of surpluses that could be traded for other consumption goods and therefore a higher standard of living.
3. Given the predominance of agriculture in medieval and early modern economies, agricultural productivity estimates help us know when regions or nations began to generate adequate surpluses for industrial growth and urbanisation, or conversely, descended into economic stagnation or even deterioration.
4. Estimates of agricultural productivity, along with a deeper understanding and appreciation of traditional agrarian practices, could throw light on their efficacy as compared to “modern” techniques. Preconceived notions of traditional knowledge vis-à-vis colonial “science” can then be debated on the basis of quantitative parameters rather than impressions.
5. Cosgel (2004) in his study of agricultural productivity in the Ottoman Empire between the 15th and 16th centuries emphasised the need to add to the archive of known agricultural productivities so as to enable comparative studies of economic performance and living standards (p. 2). Estimating agricultural productivity from unexploited data sources, especially from countries like India where quantitative estimation has been relatively sparse, is a valuable contribution to this small, but growing archive.

This list is undoubtedly not exhaustive. However, it adequately exemplifies the importance of estimating agricultural productivity.

It is important to mention something about the data source used for this study; Buchanan’s Journey. The year 1800 marked the end of pre-colonialism and beginning of colonial intervention in the erstwhile Mysore state. The East India Company having acquired an economic interest in Mysore, the then Governor General of India, Richard Crowley (also the Marquis of Wellesley) commissioned Francis Buchanan to conduct a comprehensive survey of Southern India. Buchanan travelled through many parts of the region in one continuous stretch of over 14 months, between 23 April 1800 and 5 July 1801, meticulously collecting information on a range of physical, political, cultural, social and economic subjects. His findings were published in 1807 in three volumes totalling more than 1,500 pages. In spite of the enormity of the work accomplished, the published volumes remained more like a diary with exhauster notes. Buchanan was well aware of this and regretted the incompleteness of his work at the time it went to the publishers. He lamented,

I hope ... the Index ... will in some measure supply the want of method, in which I am sorry that the Work is so deficien (Buchanan 1807: i.viii).

In some sense this paper is an attempt to “complete” Buchanan’s extensive work by collating and systematically analysing the data relating to agricultural productivity, which otherwise remains scattered bits and pieces of information. Together with earlier research based on intensive and rigorous study of the Journey this paper endeavours to leverage Buchanan’s survey to the maximum extent possible to further our knowledge of precolonial Southern India at the turn of the 19th century.

I begin with a brief review of historical estimates on agricultural productivity that can be found for North-West Europe. Unfortunately, reliable estimates of agricultural productivity for the pre-1800 period outside of this region are relatively sparse (Cosgel 2004: 1). Estimates for India remain even rarer. With this overview in place I move on to the core of the paper; compiling quantitative and qualitative data contained in Buchanan’s Journey to estimate an aggregate per capita grain output for both regions in the study. Based on these estimates the conclusion relates my findings to studies on real wages and standard of living in the region and by making some critical observations on the implications of agricultural surpluses, if any, on the domestic economy. I have also attempted to integrate this work with earlier work on standard of living based on consumption baskets for Southern India to reassess India’s position in the Great Divergence debate which has otherwise remained rather tentative. These observations hopefully vindicate the objective of the paper, which is essentially an exercise in measurement.

**Historical Estimates of Agricultural Productivity**

This section is neither a survey nor a critical review of literature on historical agricultural productivity estimates. No critique of methods employed by researchers to arrive at their estimates is undertaken. However, it will not be out of place to mention that most of the studies have had to make their own set of simplifying, or even oversimplifying assumptions given the one common fact; working with inadequate data sets that
do not contain information on all parameters. The only purpose then of this brief review is to obtain order of magnitude points of reference of agricultural yields in terms of output per acre, output per worker or output per capita in the late medieval and early modern period.

Allen (2000) draws a comparative picture of agricultural output per capita and per worker across several European countries for the period 1300 to 1800. Setting England’s productivity in 1500 as 1.00 his findings show that while output per worker increased throughout Europe, output per capita declined consistently in all countries. Moreover, England’s productivity remained the highest amongst all countries throughout the period.

In another study, Allen (2004) integrates agricultural productivity estimates from the Yangtze Delta in China into the above estimates and finds the latter’s productivity levels to be higher than most European regions except England and Belgium. The same study also provides a comparative picture of agricultural productivity in terms of output per acre between England and this region of China in the first quarter of the 19th century. However, rather than physical quantities of output, Allen provides us with output in money terms, using exchange rates adjusted for purchasing power parity. On income comparisons too, the Yangtze Delta does very well with its real income on par with that of England.

Brunt (1999) in his study of English agriculture from around 1700 to 1814 found average wheat output to be approximately 1.1 quarters or 1.44 kg per capita per day. This is significantly different from Turner et al’s (2001) estimate of per capita availability of wheat around 1750 at 5.6 bushels per capita per year or less than 500 grams per capita per day. Taking into account only those who consumed wheat (the wheat-eaters) they arrive at a figure of approximately nine bushels per capita per year or a per capita daily availability of about 0.71 kg (2001: 216).

Cosgel (2004) estimated agricultural productivity in selected regions of the early Ottoman Empire during the 15th and 16th centuries from the original tax registers. The grain output per worker is computed in standardised units of bushels/year across the region and compared to the levels existing around 1850 in the rest of Europe. Setting Britain’s output per worker of 272 bushels of wheat/year in 1851 as the base, productivity levels in the Ottoman Empire around 1450–1550 were about 60% to 70% of Britain’s output per worker but exceeded the 19th century productivity levels of most other European countries.

In Portugal, at the turn of the 19th century, the national annual per capita production has been estimated by Payne (1973) to be at 174 kg of wheat and an additional 371 kg of cereals, giving a per capita grain output of almost 1.5 kg per day. Crossing over to North America, Mancall et al (2001) found agricultural land productivity declined in the lower south region of the US from between the mid-18th and early 19th centuries. According to their estimates, land productivity for corn was about 20 bushels/acre (580 kg/acre) in 1740 but declined to around 12 bushels/acre (348 kg/acre) by 1839.

Honda (1997), in a study of Japan’s industrialisation, estimated the annual per capita agricultural grain output for the period 1600 to 1872 to be in the range of 180 to 295 ltrs or about 400 gm to 650 gm per day. It is interesting to note that between 1600 and 1730 the per capita grain output steadily declined but thereafter showed consistent improvement, although productivity in 1600 remained highest.

Moving down to the tropics, Boomgaard (2002), in his attempt to estimate agricultural productivity in pre-industrial, pre-plantation Java (Indonesia) between 1815 and 1820, begins by highlighting the scarcity of data, which in many ways also captures the Indian situation:

Much less detailed and reliable are the data for the period when the colonial state (Java) was younger, namely the years between 1815 and 1880. Nevertheless, even the data of the years around 1815/20 are good enough to be used for productivity estimates, although they need quite some ‘restoring’ before we can use them for our calculations. Agricultural statistics going back as far as the early nineteenth century are probably unique for an area so near the equator. It is most fortunate that data for these years are available ... (Boomgaard 2002: 1).

Boomgaard estimated a yield of 1,650 kg/hecate or 670 kg/ acre of paddy in a single crop. Assuming a paddy: rice ratio of 2:1,9 per capita rice yields would be just about 335 kg/acre. These levels according to him put Java in the early 19th century on par or better (in terms of productivity) than other South East Asian countries including Burma, Indo–China and Vietnam in the early 20th century. In terms of calorie intake, Boomgaard computes a net per capita indirect intake of 1,840 calories per day, which he claims is “not very good, but not very bad either” (Boomgaard: 8).

Estimates of agricultural productivity in precolonial and early colonial India are rare. Perhaps the most important study of productivity in early colonial India is by Dharampal (1990), which is based on a survey conducted by a British engineer Thomas Barnard in 1770 across 800 villages over a period of five years in Chingleput District,10 an area

...of no more than moderate fertility in the Indian context and is not comparable to the fertile lands of Thanjavur district,11 or of the Godavari area12 (Dharampal 1990: 2).

From Barnard’s data Dharampal computed13 the following average levels of agricultural productivity across some 25,000 households:

| Paddy: | 3.6; 1457 (tons/hectare; kg/acre) |
| Dry grains: | 1.6; 648 (tons/hectare; kg/acre) |
| Foodgrains/ household: | 5.7; 5700 (tons/household; kg/household) |

Based on the figures stated in Dharampal’s study and converting paddy to rice in the ratio of 2:1, gave an annual rice output of 61,716 tons and dry grain output of 21,789 tons for the region. Assuming that each household had on average five persons,14 we found agricultural productivity in terms of daily per capita grain output to be about 1.78 kg. In terms of output per acre, Dharampal estimated productivity at 3,616 kg/ hectare for paddy or 732 kg/acre for rice and 1,572 kg/hectare or 636 kg/acre for dry grains. Dharampal also mentions Buchanan’s Journey but refers to just one figure of 3.5 tons/ hectare or 1,417 kg/acre of paddy (708 kg/acre) at Coimbatore.
He further remarks that this yield is substantially lower than the one reported for relatively better lands in the same district by John Hodgson, senior member of the Madras Presidency Board of Revenue in 1807 of 6.0 tons/hectare or 1,215 kg/acre of rice (Dharampal 1990: 2). Agricultural productivity in South Eastern India, both in terms of per capita grain output and per acre yields, unequivocally exceed estimates presented above for other parts of the world.

In his study of standard of living in Southern India in the early 19th century, Parthasarathi’s (1998) estimates are more modest; yields for rice are at approximately 1,500 pounds/acre or 681 kg/acre (Parthasarathi 1998: 97). This is an average figure in which he assumes 25% of the land was double-cropped and 20% of the land was good, 50% indifferent and 30% of poor quality (Parthasarathi 1998: 98). Parthasarathi, however, does not estimate grain output on per capita terms.

Given the fact that we have just about one major study of per capita grain output at the regional level for Southern India, our proposed exercise to estimate agricultural productivity for two regions, namely, Mysore state and South Canara District will be a valuable addition to the archive. Moreover, given that these regions have distinct agro-climatic profiles, the results are indispensable in making, with any sense of conviction, generalisations about agricultural productivity for a relatively larger region like South India.

Measurement of Agricultural Productivity in Mysore State
The erstwhile Mysore state underwent many changes in its political boundary all through the medieval period. At the turn of the 19th century it covered an area of approximately 77,000 square km with the greatest north–south distance being about 230 km and the greatest east–west distance about 290 km. Roughly the size of Scotland, Mysore extended between the parallels of 1° 38’ and 15° 2’ north latitude, and between the meridians of 74° 42’ and 78° 6’ east longitude. To its west, it was bounded by the Malnad or hill country, bordering the region of the Malnad or open boundary which encompassed almost the whole of the South India.

The next step was to estimate the land under cultivation from the number of ploughs. This is possible because Buchanan had purposefully recorded the wet or irrigated and dry or unirrigated land cultivable by a plough at several places, which is collated in Table 2 in the Journey. For instance, at Srirangapatnam, Buchanan records: “With five ploughs, a man cultivates 12½ acres of watered land and 25 acres of dry field” (Buchanan: 1.124).

Not fully convinced of these numbers, he recorded the information given to him by the then Resident of the East India Company in Mysore, Colonel Barry Close, which the latter had in turn procured from Diwan Purnea himself.

Table 1: Extract from the Caneh Sumareh, Mysore

<table>
<thead>
<tr>
<th>Taluks in Chintakal Rayada</th>
<th>Families</th>
<th>Houses</th>
<th>Ploughs</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>29,289</td>
<td>31,320</td>
<td>19,705½</td>
</tr>
<tr>
<td>19 Taluks in Nagara Rayada</td>
<td>72,873</td>
<td>73,948</td>
<td>46,467</td>
</tr>
<tr>
<td>91 Taluks in Pattana Rayada</td>
<td>3,31,129</td>
<td>3,90,152</td>
<td>2,28,542</td>
</tr>
<tr>
<td>Total for Mysore</td>
<td>4,33,291</td>
<td>4,95,420</td>
<td>2,94,814½</td>
</tr>
</tbody>
</table>

Source: Buchanan (1807: 3.417).

The level plains of alluvial black soil, as in the north, growing cotton or millet; the districts irrigated by channels drawn from rivers, as in the south and west, displaying the bright hues of sugar-cane and rice-fields; the lands under tanks, filled with gardens of cocoa and areca16 palms; the higher-lying undulating tracts of red soil, as in the east, yielding ragi and the common associated crops; the stony and wide-spreading pasture grounds, as in the central parts, covered with coarse grass and relieved by shady groves of trees. The aspect changes with the seasons, and what in the dry and cold months, when the fields are lying fallow, appears a dreary and monotonous prospect, speedily assumes under the first operations of the plough the grateful hues of tillage; which, under the influence of seasonable rains, give place in succession to the bright verdure of the tender blade, the universal green of the growing crops, and the browner tints of the ripening grain (Rice 1897: 3).

With this general geographical description of Mysore, we now move on to the task on hand. Estimation of agricultural productivity in the medieval period cannot follow any standard procedure for the one simple reason that almost every study is constrained by data availability. Historians must then engage in a kind of “reverse estimation,” working their way from parameters for which data is available to an estimate of productivity. At times the link between available data and parameters required for estimating productivity breaks. The only way then to bridge these gaps is to make simplifying but, as far as possible reasonable assumptions. We too cannot escape unscathed from this predicament.

Given the extreme difficulty, if not impossibility, of finding state-level data on area under cultivation in the local archives we are almost fully dependent on the Journey for all information. Perhaps this entire exercise would not have been possible if not for an eye ailment that forced Buchanan to break his journey at Srirangapatnam, the then capital of Mysore, for almost two weeks. It was at this time that he procured a copy of the Caneh Sumareh of the Mysore raja’s dominions, containing census data from across the state. Although Buchanan did not believe that the statements contained in the Sumareh were fully accurate, he decides to retain some of it in the Journey.

I have ...thrown as much as relates to the population and stock17 into the form of a table; as a nearer approximation to the truth than any that has been yet given (Buchanan: 3.413).

From the three variables in his table, two seemed of direct relevance: number of families and ploughs detailed across three districts consisting of some 123 taluks (or sub-districts). The third, i.e., number of houses was important too, albeit in a roundabout way as we shall see later. For now it suffices to mention that it indicated depopulation in the region, especially pattana rayada or the district in which the capital Srirangapatnam was located. It was here that the effects of war had taken the greatest toll. At Maddur, a town just a few kms from the capital, he notes that “the miseries of war are said to have driven away four-tenths of the cultivators” (1.55). For the whole of Mysore we find that the number of families exceeded the number of families by about 12.5%. Table 1 reproduces the summary of tables at the district level from the Journey.
The watered lands amount to 1,369 Candacas, or 8,487 acres, and the dry field to 964 Candacas, or 22,172 acres. This divided by 3078, which, according to public documents,22 is the number of ploughs in the same district, will give a farm of five ploughs 13.78 acres of watered land, and36 acres of dry field34 (Buchanan: 1.124).

It is obvious that the ratio of plough to cultivable area would vary throughout the state depending on climate, soil, irrigation and other conditions. Based on Buchanan’s observations we computed a simple average of land area cultivable per plough to be as follows:

- Wet land: 2.578 acres, and
- Dry land: 7.065 acres

In the excerpt cited above, Buchanan has explicitly stated that cultivable area per plough was computed by dividing cultivated land by number of ploughs. If we do the reverse, i.e., multiply the number of ploughs (given in the Caneh Sumareh) by cultivable area per plough we can arrive at the total land area under wet and dry cultivation in the three districts of Mysore. However, to justify this “leap” from number of ploughs to area under cultivation we need to address three important concerns.

(a) How was wet land cultivation possible to this extent across the maidan; a dry region with an average annual rainfall of less than 1,000 mm and no natural lakes? To a person familiar with the landscape of the maidan, this would be an irrelevant question. It is, therefore, pertinent to dispel this belief with a short passage from Rice’s Gazetteer:

There are no natural lakes in Mysore, but the streams which gather from the hillsides and fertilise the valleys are, at every favourable point, embanked in such a manner as to form series or chains of reservoirs, called tanks, the outflow from one at a higher level supplying the next lower, and so on all down the course of the stream at a few miles apart. These tanks, varying in size from small ponds to extensive lakes, are dispersed throughout the country to the number of 38,080; and to such an extent has this principle of storing water been followed that it would now require some ingenuity to discover a site suitable for a new one without interfering with the supply of those already in existence. The largest of these tanks is the Sulekere, 40 miles in circumference (Rice 1897: 7).

A well-developed tank irrigation system makes it reasonable to assume that every plough (on average) could have been used for cultivation of wet lands in addition to dry or rain-fed land.

A critical assumption in extrapolating wet and dry land under cultivation from the number of ploughs is the “full” utilisation of ploughs. Even if ploughs were central to the cultivation process (as is evident in many of the passages in the Journey)25 the computations in Table 3 (p 71) would be meaningless if ploughs were just lying around, unutilised. We need to, therefore, justify our stance that ploughs were restricted in number and actually acted as a constraint to area under cultivation. Only then can we assume that they were indeed fully utilised. First, the very fact that the Caneh Sumareh provides a census of ploughs in each taluka stresses its importance in cultivation. Second, Buchanan selected number of ploughs along with two other variables from the Caneh Sumareh, ignoring several others, only reinforces the first point. Third, in a few instances Buchanan makes remarks that clearly indicate that ploughs and accompanying paraphernalia were actually scarce. For instance, at Hiriyur, he mentions:

...there is at present a deficiency of stock26 (Buchanan: 2.99).

And at Pirypaduta farmers reported that a superior method of rice cultivation could not be adopted because,

by far the greater part of the farmers have only one (plough); and many ... are necessitated to unite their stocks before they can furnish two oxen, and the miserable implements which are necessary to accompany one plough. The extent of land cultivated by one plough is greater than usual in India ... (Buchanan: 3.349).

Finally, throughout the Journey, Buchanan categorises the status of farmers in terms of the number of ploughs they own:

One plough is a poor stock; the possessor of four or five is a great farmer; and six or seven are reckoned prodigious wealth (Buchanan: 1.124).

These arguments go on to show that at a time when land was in abundance, the number of ploughs owned by farmers was in fact a limiting constraint on cultivation. However, as evident from the Caneh Sumareh (Table 1), more than 12.5% of the houses in Mysore remained unoccupied. It was, therefore, not only ploughs that were scarce but also cultivators. Therefore, I assume that the same proportion of ploughs were unused, abandoned by the cultivators who had migrated out of the region. If and when they returned, the ploughs would have been put into use; output would have increased but with a proportionate rise in population.

(c) Finally, we also need to be wary of any possibility in overestimating area under cultivation. This would happen if cultivable area by a plough had been overrated. Once again specific remarks made by Buchanan and the fact that agriculture was taxed at a rate of about 50% negate the possibility of overestimation. We quote his comments from Srirangapatnam and Belur respectively:

The account of these persons, concerning the quantity of ground that can be laboured by one plough, is probably under-rated (Buchanan: 1.124).

...farmers greatly over-rate their expenses, or under-rate the produce and extent of land cultivated by one plough; and probably they do both ...(Buchanan: 3.399).

Having taken adequate precautions over any possible overestimation, we extrapolate from number of ploughs to area under cultivation. The results obtained from the computations are summarised in Table 3.
We now explore the Journey to determine the kind of crops grown on the wet and dry lands of Mysore. The one thing that strikes a reader of Buchanan’s survey is the complexity in range and variety of crops grown in Southern India. Any pre-conceived notion of production being limited to a couple of types of grain soon disappears. On wet lands a wide range of crops from rice to sugarcane to pulses were grown. Furthermore, for each crop we find a large variety of specific types.

Table 3: Computation of Wet and Dry Land Cultivable in Mysore

<table>
<thead>
<tr>
<th>Ploughs Cultivated (Acres)</th>
<th>Wet Land Cultivated (Acres)</th>
<th>Dry Land Cultivated (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Taluks in Chattrakal Rayada</td>
<td>19,705.5</td>
<td>14,779</td>
</tr>
<tr>
<td>19 Taluks in Nagara Rayada</td>
<td>46,467</td>
<td>34,850</td>
</tr>
<tr>
<td>91 Taluks in Pattanan Rayada</td>
<td>2,28,542</td>
<td>1,71,407</td>
</tr>
<tr>
<td>Total for Mysore</td>
<td>2,94,814½</td>
<td>2,21,036</td>
</tr>
</tbody>
</table>

For instance, some eight different varieties of rice have been mentioned by Buchanan, three types of sugar cane, and so on. The range and variety on dry lands is even more daunting with several types of ragi, three types of corn, and so on. We, of course, will not go into the details; rather our task requires us to condense all this into more manageable numbers.

Knowledge of the most commonly consumed grains in Mysore as well as a thorough search of the Journey helped delineate the choice of grains for estimation; rice and ragi. Reproduced here are some of Buchanan’s remarks that validate our choice of grains:

The articles which the ashta gram farmers cultivate in the wet grounds are, rice, sugarcane, Udu, Hessaru, Wall’ Ellis, and Tadaguny. Of these, rice is the one of by far the greatest importance (Buchanan: 1.83). By far the most common seed used is Doda Butta, a coarse grain, like that which, in Bengal, is by the English called cargo rice (Buchanan: 1.86).

The crop of Ragj is by far the most important of any raised on dry field, and supplies all the lower ranks of society with their common food (Buchanan: 1.102).

We delineate the cropping pattern for our estimations as follows:

- Rice on wet land with Doda Butta as the principal type, assuming that 60% of wet land was used for rice cultivation.
- Ragi on dry land, assuming that 75% of dry land was used for ragi cultivation.

Perhaps the most valuable and systematically recorded information in the Journey is the yield per acre of rice and ragi. It is interesting to note the caution and care Buchanan took while collecting data. A short passage illustrates that the Journey was no mere travelogue; it had crucial elements of a methodologically valid survey.

The estimate of seed, and produce of an acre, I obtained by taking three sensible farmers to a small field, and asking them how much seed it would require, and how much it would produce. No revenue officer was present, nor did the field belong to any of the farmers. I then measured the field, and reduced the measures to the English statute acre and the Winchester bushel. Not having been entirely satisfied with this manner of ascertaining the produce, on my return to Seringapatnam I questioned the same persons on this subject ...(Buchanan: 1.100).

Before utilising Buchanan’s data on yield per acre to estimate the total grain output we have to deal with a further complexity: multiple types of soil with varying yields per acre and also what Buchanan sometimes refers to as “in a good” or “in an indifferent” crop (Buchanan: 1.402).

Near Srirangapatnam, Buchanan reported four different kinds of soils; black soil or eray, red soil or kempu bumi, brown soil or maralu and finally, sandy soil or daray (Buchanan: 1.83). In a situation where multiple yields have been reported because of soil type or good/indifferent crops, we will use a simple average of yields per acre for our estimations. Taking this assumption into account, Table 4 summarises the yield per acre for rice and ragi reported by Buchanan from various locations.

Unfortunately, no precise estimate can be made of cropping ratio from the Journey. We, therefore, resort to making a calculated guess. In the case of dry land, which by definition is unirrigated, we take cropping ratio as one. For wet lands, Buchanan’s reports seem to vary between three crops to a single crop of rice per year as reproduced below:

The farmers of the ashta gram have annually two crops on their wet grounds (Buchanan: 1.83). In many parts, favoured with a supply of water, three crops of rice are every year regularly produced (Buchanan: 1.93). Two crops of rice are never taken from the same field in one year ...(Buchanan: 1.139).

### Table 4: Yields in Bushels per Acre, Extracted from the Journey

<table>
<thead>
<tr>
<th>Vol/Page No</th>
<th>Place</th>
<th>Rice Yields, Bushels Per Acre</th>
<th>Ragi Yields, Bushels Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.99</td>
<td>Srirangapatnam</td>
<td>31.3</td>
<td>23.35</td>
</tr>
<tr>
<td>1.100</td>
<td>do</td>
<td>x</td>
<td>19.5</td>
</tr>
<tr>
<td>1.140</td>
<td>Maddur</td>
<td>41.3</td>
<td>x</td>
</tr>
<tr>
<td>1.366</td>
<td>Madhugiri</td>
<td>39.9</td>
<td>x</td>
</tr>
<tr>
<td>1.376</td>
<td>do</td>
<td>x</td>
<td>28.9</td>
</tr>
<tr>
<td>1.402</td>
<td>Sira</td>
<td>36.7</td>
<td>27.8</td>
</tr>
<tr>
<td>2.99</td>
<td>Piriapatna</td>
<td>28.83</td>
<td>22.15</td>
</tr>
<tr>
<td>3.240</td>
<td>Banawasi</td>
<td>x</td>
<td>5.5</td>
</tr>
<tr>
<td>3.275</td>
<td>Nagara</td>
<td>x</td>
<td>25.79</td>
</tr>
<tr>
<td>3.294</td>
<td>Shimoga</td>
<td>15.4</td>
<td>x</td>
</tr>
<tr>
<td>3.306</td>
<td>Saisayevalli</td>
<td>x</td>
<td>7.4</td>
</tr>
<tr>
<td>3.330</td>
<td>Bellaguru</td>
<td>23.3</td>
<td>x</td>
</tr>
<tr>
<td>3.336</td>
<td>Budhilalu</td>
<td>57.8</td>
<td>x</td>
</tr>
<tr>
<td>3.336</td>
<td>Baniwara</td>
<td>42.7</td>
<td>x</td>
</tr>
<tr>
<td>3.396</td>
<td>Belur</td>
<td>x</td>
<td>16.7</td>
</tr>
<tr>
<td>3.446</td>
<td>Kellamangala</td>
<td>45</td>
<td>x</td>
</tr>
</tbody>
</table>

Average for all Taluks: 36.2 bushels per acre

At Belur, Buchanan mentions rice yields of 72.5 bushels per acre. These are exceptionally high and as an "outlier" we have kept it out. Source: Buchanan (1807).
• Convert bushels to kg
• \[\text{Total output of paddy}] \times [0.5 \text{ as conversion of paddy to rice}] = \text{rice output in kg}
• \[\text{Rice output}/\text{number of households} = \text{Per household rice output in kg}
• \[\text{Per household rice output}/[5] = \text{Per capita rice output in kg}

Per Capita Ragi Output for Each Taluka:
• \[\text{Number of ploughs}] \times [7.065 \text{ acres of dry land per plough}] = \text{Dry land under cultivation, kg}
• \[\text{Dry land under cultivation}] \times [0.75 \text{ as area under ragi cultivation}] \times [1 \text{ as cropping ratio}] = \text{Effective area under ragi cultivation}
• \[\text{Effective area under ragi cultivation}] \times [\text{ Net average yield of ragi per acre of land}] = \text{Total output of ragi in bushels}
• \[\text{Convert bushels to kg}
• \[\text{Total output of ragi}/\text{number of households} = \text{Per household ragi output in kg}
• \[\text{Per household dry grain output}/[5] = \text{Per capita ragi output in kg}

Table 5 shows the process by which the estimate of agricultural productivity in terms of annual and daily per capita grain output (rice plus ragi) for entire Mysore at about 433 kg and 1.18 kg respectively was arrived at. Moreover, from Table 4 we estimate agricultural productivity in terms of annual and daily per capita grain output (rice plus ragi) for entire Mysore at about 433 kg and 1.18 kg per day implies per capita grain availability of approximately 1.96 kg per day.

Measurement of Agricultural Productivity in South Canara

The region of South Canara, presently called Dakshina Kannada, is a long, narrow strip that lies on India's west coast, bounded on its east by the Western Ghats and covers an area of just about 4,771 square kilometers. The district faces the direct onslaught of the south-west monsoons, receiving an annual rainfall of close to 8,000 mm. It is a predominantly rice growing region. At the time of Buchanan's Journey, South Canara was part of the province of Canara and Soonda of the Madras Presidency.40

Even before Buchanan entered South Canara on his journey, he had sent a list of queries to John Golsborough Ravenshaw, collector of the southern division of the Canara province. In his reply, Ravenshaw provided an important piece of information; rice-land actually cultivated was 2,25,782 Morays. With each Moray being equal to 1.13 acres, the total area under rice cultivation in South Canara was 2,55,134 acres. Moreover, as in the case of Mysore, Buchanan also provides us a summary of the Caneh Sumareh, a statement of population statistics in the ten talukas of the district. Though the details are not of relevance to us, the total population of the district, which at that time was estimated to be 3,96,672 persons, is absolutely necessary for an estimation of per capita rice output.

Buchanan reported three kinds of lands used in the cultivation of rice; the bylu (lower valleys), majelu (higher ground that have access to reservoirs) and betta (hill land) which is essentially rain-fed land (Buchanan: 3:37). We now attempt to approximate the cropping ratio for each of these lands. The bylu lands usually gave two crops of the same quality and sometimes even three crops. At Mangalore, Buchanan mentions:

On the bylu land there are three crops in the year, 1st Yenalu, 2d. Sugi and 3d, Colaky (Buchanan: 3:36).

The South Canara Gazetteer, compiled by John Sturrock almost a century after the Journey, throws more light on rice cultivation on different types of land. Like Buchanan, Sturrock too mentions that sometimes three crops are taken bylu lands, sometimes two crops of rice and one of dry grain, sometimes only two crops of rice and on occasions even just one crop may be taken. A specific remark that helped us making a finer approximation was:

...the greater part of bail (bylu) gives only two crops (of rice) (Sturrock 1894: 193).

However, just a few pages later we find another remark, somewhat contradictory:

The staple produce of South Canara is rice (Oryza sativa) which is cultivated in all the valleys of this well-watered district, as many as three crops being grown every year on a considerable portion41 of the low-lying lands (Sturrock 1894: 199).

Although it seemed that between two and three crops were taken from bylu lands there was another issue we had to contend in making an informed guess on the cropping ratio; yield of the first, second crop and third crop. Here the Gazetteer was more definitive:

With some degree of approximation to the truth it may be said, in general, the outturn of the second crop to that of the first is as two to three, or three to four, or even four to five, and in certain exceptional cases, the one may be equal to the other, or even more than the first (Sturrock 1894: 202).

Putting these comments together, including the fact mentioned by Sturrock that when rice was not cultivated as the second or third crop there was every possibility that the
been the most prominent: description of the landscape tells us that bylu lands would have coast where rice was (and is) extensively cultivated, the de-

moves westwards towards the district does have large tracts of forests and hills slopes to its east, these were not typically cultivated, let alone

developed from the betta lands ... (Sturrock 1894: 193).

Finally, for betta lands, Sturrock categorically asserts,

As the rainfall, however, is very abundant, one good crop of rice is usually obtained from the betta lands ... (Sturrock 1894: 202).

We, therefore, make a rather straightforward assumption that cropping ratio for betta lands was 1.

Before we can put the cropping into effect, there is yet another complexity that we face; the proportion of each land type to total land under rice cultivation. Once again we have to draw inferences from the Gazetteer rather than Buchanan's Journey. Moreover, these inferences come from a general description of the landscape of South Canara rather than any specific data to support our assumptions. In their descriptions of the three types of lands by both, Buchanan and Sturrock, bylu lands take first place, followed by majelu and last by betta. This order of describing rice-lands seemed to follow from their order of prominence. Moreover, even though the district does have large tracts of forests and hill slopes towards its east, these were not typically cultivated, let alone being rice-lands. When we move westwards towards the coast where rice was (and is) extensively cultivated, the description of the landscape tells us that bylu lands would have been the most prominent:

The general aspect of the District has been well described as a flatness uniform but infinitely diverse ... Valley opens upon valley in picturesque and diversified similarity, all converging at last into the main valleys through which the larger rivers of the District run (Francis et al 2002: 370, 372).

In a study of the port town of Basrur in South Canara District, Subrahmanyam's (1990) description of the region also indicates that rice-lands were predominantly bylu and majelu.

With an extensive and stable rainfall from the south-west monsoon, the area was by and large mostly triple-cropped or double-cropped, with rice being the major product ... (p 260).

In a district that is well known, even famed, for its rice cultivation, we consider the following a fair assumption: 50% of rice-lands bylu, 30% majelu and remaining 20% betta. A final comment in the Gazetteer gives us confidence that our assumption of cropping ratio and proportion of each type of rice-land to the total rice-land under cultivation is not only reasonable but more possibly a lower bound:

Even though the district is almost 25% forest, rice is by far the most important staple, the area under it (counting twice over that cropped twice) being 760 square miles (or almost 2,000 square km) (Francis et al 2002: 381).

To estimate the total quantum of rice produced from the 2,55,134 acres under rice cultivation, we use yield per acre data reported by Buchanan from a few farms from villages of Seroor, Coligay and Himana in Barkur taluka. These were reliable measurements of actual output since, ... the grain having been cut down, beaten, and measured, in the presence of Valuators (Buchanan 1807: page facing 3.102).

I have summarised this data in Table 6 and computed average yield of paddy in bushels for each type of land. This is then multiplied by the cropping ratio to give us an effective yield per acre per year from each type of land. We then compute a weighted average of effective yield per acre from each type of land, the weights corresponding to the proportion of each type of land to total amount of rice-land under cultivation. From this an aggregate effective yield per acre across all types of lands at 57.71 bushels of paddy per acre per year is obtained. The per capita rice output for the district is computed as follows:

Per Capita Rice Output for South Canara:

\[
\text{Per capita output in kg} = \frac{\text{Aggregate effective yield of paddy per acre} \times \text{Total area under rice cultivation}}{\text{Population of South Canara}}
\]

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\]

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\[
\text{Per capita output in kg} = \frac{\text{Aggregate effective yield of paddy per acre} \times \text{Total area under rice cultivation}}{\text{Population of South Canara}}
\]

<table>
<thead>
<tr>
<th>Type of Land</th>
<th>Yield per Acre (Bushels)</th>
<th>Average Yield per Acre (Bushels)</th>
<th>Cropping Ratio</th>
<th>Effective Yield per Year</th>
<th>Proportion of Type of Land to Total Rice Land</th>
<th>Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bylu</td>
<td>31.06</td>
<td>45.02</td>
<td>2</td>
<td>90.05</td>
<td>0.5</td>
<td>45.25</td>
</tr>
<tr>
<td>Majelu</td>
<td>25.67</td>
<td>23.82</td>
<td>1.5</td>
<td>35.73</td>
<td>0.3</td>
<td>10.72</td>
</tr>
<tr>
<td>Betta</td>
<td>9.48</td>
<td>7.67</td>
<td>1</td>
<td>7.67</td>
<td>0.2</td>
<td>1.54</td>
</tr>
</tbody>
</table>

Aggregate effective yield of paddy per acre: 57.71

From this we get an estimated annual per capita rice output of 533.22 kg or a daily per capita rice output of 1.46 kg. The per capita grain availability, assuming a family size equivalent to three adults, works out to 2.4 kg per day. Furthermore, aggregate effective yield of paddy at 57.71 bushels/acre gives a per acre rice yield of 836.80 kg. This figure although higher than Dharampal's (1990) and Parthasarathi's (1998) estimates for Chingleput and Coimbatore respectively, is still lower than Hodgson's estimates of some districts in Madras Presidency. When we consider the comment in the Gazetteer given below, this estimate can be considered realistic though more possibly an underestimate.
It is doubtful if any district in the Presidency shows such an orderly and careful cultivation ... (in terms of) the choice and rotation of crops, the properties of various soils, the selection of seeds and seed-beds, the number of ploughings, the amount of manure, the distribution of water ... (Francis et al 2002: 38).

Observations and Conclusions

What inferences can be drawn from these figures?

(1) This study shows that productivity in terms of per capita grain availability at about 1.96 kg per day is well in sync with estimates of per capita grain consumption and standard of living for the same region, based on Buchanan’s Journey (Sivaramakrishna 2009).

(2) With a wide variance in agricultural productivity estimates for Europe, we are unable to definitively position Mysore in the list. This, however, is not true for South Canara. Not only is its level of yield per acre relatively high but in terms of per capita grain output it, along with many other rice growing regions of India, produced high quantities of surplus that were exported to markets across India and the world.

(3) There is a difference in agricultural productivity of the two regions; South Canara’s per capita grain output and availability 20% higher than that of Mysore. On a per acre yield basis too, South Canara shows an even higher margin over Mysore. It is also important to note that apart from differences in these physical measures of productivity between Mysore and South Canara, the difference between them in terms of monetary value of output would be even greater. Dry grains like ragi were priced at just about 15.2d per bushel whereas even low quality coarse rice was priced at about three times that of ragi at about 35.1d per bushel (Buchanan 1807: 3.59). This fact could then reflect on the general level of agricultural prosperity in the two regions. It is, however, pertinent to mention that proto-industrialisation in the maidan was more extensive than coastal regions; mining, iron and steel manufactures, coarse blanket making, etc, were found all across Mysore.

(4) From the above estimates of per capita grain consumption and availability, it is evident that Mysore would not have had substantial surpluses of grain for export out of the region. A careful reading of Buchanan’s report from Gubi where “one of the greatest weekly fairs in the country” (Buchanan 1807: 2.31) was held, reveals that although some “rice, ragy, and other grains” for consumption in the neighbourhood was found at the fair, no mention of grains is to be found in his description of “goods passing through the peninsula” (Buchanan: 2.31). However, it is necessary to mention that dry grains did flow from deficit to surplus regions within the region, but as a whole it does not seem that there were substantial surpluses available for export. This is also evident from Buchanan’s comment that

Notwithstanding this scarcity, the natives are not absolutely in want of provisions; for they bring a supply of grain from other places that have been more favoured (Buchanan: 2.34).

Such scarcities were usually the outcome of scanty rainfall and its uneven distribution across the region. However, famines rarely occurred as grain would flow from areas where a good monsoon brought bountiful crops to deficient regions of the state. In spite of this the maidan often suffered from an inadequate grain for all:

It is said, that one fourth of the grain, which, in times of plenty, the people usually consume, is sufficient to keep them alive, and enable them to work for their subsistence (Buchanan: 1:390).

These descriptions on the nature of grain flows in the maidan only go on to show that although grain moved from region to region it was mainly for subsistence and not a commodity of regular export. It was perhaps the exchange and trade in proto-industrial manufactures that allowed a higher real wage of 4.7 ragi baskets in this region.

(5) As in the case of Mysore, Buchanan’s Journey also indicates high levels of grain (rice) consumption in South Canara; for instance at Ullal, he reports:

The cultivation is chiefly carried on by Calilau, or hired servants... A hired man gets daily 2 Hanies of clean rice, or annually 21½ bushels, together with ½ Rupees worth of cloth, a Pagoda in cash, and a house. A hired woman gets 1½ Rupee for cloth, and ¾ of the man’s allowance of grain... These wages are very high and may enable the hired servants to keep a family in the greatest abundance (Buchanan: 3:35-36).

This means that a working couple would get a real wage (paid in kind) of close to 3 kg/day of clean rice or a per capita grain availability of more than one kg per day per person (for a family equivalent to three adults). However, with the estimated per capita grain availability of 2.4 kg per day it is clear that a large exportable surplus from this region was available.

(6) South Canara was an exporter of rice over centuries. Subrahmanyan (1990) tells us of the situation in the 16th and 17th centuries when:

The port town of Basrur, located on the Kanara coast in 13° 37’ North...was the rice port par excellence on the coast. Bhaktali to the north and Mangalore to the south exported rice as well, as did a whole host of other minor Kanara ports...(p 260).

Table 7: Exports of Rice from Mangalore Port, South Canara

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity in Morays</th>
<th>Quantity in Bushels</th>
<th>Quantity in Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1796</td>
<td>173,355.5</td>
<td>2,17,128</td>
<td>6,297</td>
</tr>
<tr>
<td>1797</td>
<td>1,57,475</td>
<td>1,97,237</td>
<td>5,720</td>
</tr>
<tr>
<td>1798</td>
<td>2,97,371</td>
<td>3,72,457</td>
<td>10,801</td>
</tr>
</tbody>
</table>

Source: Buchanan (1807:3-facing, p 4).

This continued well into the 19th century. As Buchanan put it, “rice is the grand article of export. It is sent to Muscat, Bombay, Goa, and the Malabar” (Buchanan 1807: 3:58). From the “Account of Sea Customs” attached in the Journey, Mangalore port alone exported a few thousands of tons of rice annually as summarised in Table 7. This volume of exports from Mangalore is uncannily similar to Washbrook’s figures for South East Indian ports.

The English East India Company (EEIC) trade registers noted dozens of small ports along the Thanjavur coast before 1782, each thought to be responsible for the export of 5,000–10,000 tons of paddy a year (Washbrook 2006: 4).

(7) Although not an explicit objective of this study, it is nevertheless interesting to compare our productivity estimates with present levels. Looking at the figures in Table 8 (p 75) based on Food and Agricultural Organization (FAO) data for the year 2004–05 (Ravikiran 2008), India’s stagnation (when we make a comparison over the last couple of centuries) in terms of per acre grain yields is disconcerting. What is, however, even more
disconcerting is India’s per capita grain output which has shown a decline from 182 kg in 1994–95 to 155 kg by 2003–04 (Patnaik 2009). A comparison between these figures and those from precolonial India as estimated in this paper should provoke us to pose serious questions about economic development, or rather underdevelopment, in colonial and postcolonial India.

(8) Finally, one is surprised that the estimates turned out realistic, even if just as an “order of magnitude”; this in spite of simplifying assumptions made and given the small sample size relative to that of the region under consideration. The credit here must go to Buchanan for the quality of data collected and compiled on the state of agriculture in Southern India more than 200 years ago. We can fully appreciate a remark made by one of India’s most distinguished statisticians, P C Mahalanobis, on another of Buchanan’s surveys in Bengal (North Eastern India):

The wealth and reliability of the information (so far as this can be judged from original evidence) make the report one of the most remarkable surveys of all time. There is nothing in any subsequent survey in India to approach the one conducted by Buchanan 140 years ago (Bhattacharya and Roy 1977: 66).

Not only do we concur with Mahalanobis’ remark but also believe that Buchanan’s Journey has made it possible to strengthen the basis to vindicate the claims of the revisionists in the Great Divergence debate.

### Table 8: Per Acre Grain Yields

<table>
<thead>
<tr>
<th>Country</th>
<th>Yield Per Acre (in kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>1,274</td>
</tr>
<tr>
<td>China</td>
<td>1,578</td>
</tr>
<tr>
<td>Japan</td>
<td>2,691</td>
</tr>
<tr>
<td>USA</td>
<td>3,011</td>
</tr>
</tbody>
</table>


### Notes

1. Buchanan (1807) has been referred to as Journey throughout this paper.
3. Ragi, or finger millet (Eleusine coracana), was and is still the widely consumed grain in Mysore region.
4. This aspect has been extensively discussed in Sivaramkrishna (2009). The quantity of 2 kg per day per capita does seem exceptionally high. However, it is quite possible that wage labourers and others hoarded a good quantity of grain for contingencies of war and unemployment. This could have been a serious issue for as Buchanan had observed many areas were uninhabited because of wars that had ravaged the region.
5. Throughout our paper, Mysore will refer to the erstwhile State of Mysore. It does not coincide with the present district and city of Mysore, now located in the Indian state of Karnataka.
6. Sometimes also known as Francis Buchanan Hamilton or Francis Hamilton.
7. Throughout this paper, while referencing Buchanan we use the following notation (volume number, page number).
9. Throughout this paper we have assumed a paddy:rice ratio of 2:1. This is based on Buchanan’s records at Srinagarapattanam he notes, “ten parts of paddy...gives five parts of rice” (1.92) and at Kellamangalam he confirms, “a Candaca of rough rice gives half a Candaca of clean grain” (3.447).
10. This district borders Madras (now Chennai) in present-day Tamil Nadu.
11. Thanjavur District is a fertile rice growing region in present-day Tamil Nadu.
12. The Godavari area is also an important rice producing belt in present-day Andhra Pradesh.
13. We have converted these into metric measures wherever possible.
14. In our per capita output computations we consider an average family to have five persons.
15. We consider this as reasonable for that time in this region since Buchanan too assumed “five inhabitants to each house” while making his population estimates (Buchanan 1807: 1.76).
16. Coimbatore is in present-day Tamil Nadu.
17. Arroo is the local name for the betel-nut tree.
18. Stock refers to number of ploughs and other agricultural implements.
19. Buchanan mentions a third type of land called bagat or garden (Buchanan: 1.83). These were used primarily for horticultural produce though sometimes also for grain cultivation. We have, however, left it out of our study as data for gardens is scarce in the Journey.
21. These figures have been included in Table 2 on a per plough basis.
22. Diwan Purnea was the highest de facto authority in Mysore at that time since the de jure Raja of Mysore Krishnaraja Wodeyar III was a minor.
24. These figures have also been included in Table 2 on a per plough basis.
25. Buchanan has provided detailed qualitative accounts of the cultivating practices. The repeated ploughing of lands has been described in many places along his journey. We have not reproduced these passages as they would take us away from the objective of this paper.
26. Buchanan often referred to ploughs as stock.
27. Also refer Sivaramkrishna (2009) for more details on the commonly consumed grains in Mysore.
28. Wherever this type is not grown, we take the most commonly grown type in that region.
29. Sugar cane (not a food grain) was the other extensively crop grown on wet lands.
30. Buchanan reports from Maduguri (1.37) that ragi “forms two-thirds of the whole dry crop”. However, as various other dry grains (like jola or corn) and pulses were cultivated on dry lands we consider 75% of dry land under ragi cultivation. The remaining 25% of the area we assumed was used for non-food crops like cotton, tobacco or castor that find mention in the Journey.
31. Yield per acre of various other crops have also been reported in the Journey. We, however, have kept these out of our study.
32. Parthasarathi (1998) assumed that 25% of wet land was double cropped and that yields for both crops were equal. This we feel is too conservative an estimate given the extensive availability of tank irrigation in Mysore.
33. Obtained from Table 2.
34. Obtained from Table 4.
35. To compute output in kg we assume that 1 bushel = 29 kg, for both rice and ragi.
36. Assuming each family consists of five persons.
37. Obtained from Table 2.
38. Obtained from Table 4.
39. This measure is usually adopted while computing real wages. See, for example, Allen (2008) and Sivaramkrishna (2009).
40. Presently, the erstwhile State of Mysore and South Canara District are part of the State of Karnataka.
41. Emphasis my own.
42. Emphasis my own.
43. Emphasis my own.
44. We ignore one table that gives yields from seven estates in five villages since no information is provided as to the type of land on which cultivation took place.
45. To compute output in kg we assume that 1 bushel = 29 kg, for both rice and ragi.
46. From Buchanan’s report at Seroor village it may seem that the clean rice:pepper ratio in South Canara is actually lower than in Mysore, varying between 37% in bylu lands to 42% in majelu lands. However, it is important to note that figures given by him for clean rice are “after deducting the expense of beating and cleaning” (page facing 3.102). This deduction need not be taken in computing conversion of paddy to rice while estimating gross output of the district. We, therefore, maintain paddy:rice ratio of 2:1.
47. For Chingleput District, based on Dharampal’s estimates of per capita grain output at 1.78 kg per day, we get a per capita grain availability of 2.96 kg per day. Our estimates for South Canara are a of similar order of magnitude and possibly an underestimate.
48. Per capita grain availability was 174 kg in 1994-95 and 155 kg in 2003-04 (Patnaik 2009).

### References

Higher Education in India

In Search of Equality, Quality and Quantity

Edited by JANDHYALA B G TILAK

India has a large network of universities and colleges with a massive geographical reach and the facilities for higher education have been expanding rapidly in recent years. The story of higher education in India has seen many challenges over the decades and has not been without its share of problems, the most serious being a very high degree of inequity.

Drawn from writings spanning almost four decades in the EPW, the articles in this volume discuss, among other things, issues of inclusiveness, the impact of reservation, problems of mediocrity, shortage of funds, dwindling numbers of faculty, and unemployment of the educated young.

Authors: André Béteille • Shiv Visvanathan • Suma Chitnis • Satish Deshpande • K Sundaram • Rakesh Basant, Gitanjali Sen • Jayati Ghosh • Thomas E Weisskopf • Lloyd I Rudolph, Susanne Hoeber Rudolph • A M Shah • Errol D’Souza • G D Sharma, M D Apte • Glynn L Wood • Thomas Joseph

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