

CHAPTER 2: BASELINE CONDITIONS

Introduction

This chapter deals with the baseline economic and natural conditions of the Kathmandu Valley. Various important sectors of the Valley have been integrated within the framework of a multimarket model as described in Chapter 2. These sectors include food, energy, trade, tourism, employment, and income originating from different sectors. Since each of the three districts belonging to the Kathmandu Valley are comprised of both rural and urban sectors, the baseline conditions of these two sectors have been dealt with separately where possible. While the model has captured all the major activities of the rural areas of the valley, it has not been possible to integrate all the activities of the urban areas due to the lack of information. This lack of information has been a serious drawback in developing a suitable model for the urban areas. Thus some sectors had to be dealt with separately and are presented as separate reports. It is because of this lack of information that the baseline results have been forecasted for a five-year (1991-1995) period only.

Price Trend

Several agricultural products and input prices have been forecasted using time trend equations fitted to historical data. These prices were calibrated to match the 1991 prices. Similarly, several energy price series have also been forecasted to develop the energy model for the urban sector of the valley. Table 2.1 presents the forecasted price of agricultural output, inputs, and energy.

The average annual growth rate of agricultural and livestock product price, in general, ranged from five per cent (maize) to about 11 per cent (buffalo meat). The aggregate meat price is projected to grow at a faster rate than that of the aggregate cereal grain price. The forecasted prices of six different types of fuel indicate the highest growth rate for electricity and the lowest for kerosene. The average annual growth rate of the commercial electricity price has been found to be higher than that of the electricity tariff for domestic use. The details are presented in (Table 2.1).

Crop Sector

Agriculture is the primary economic activity in the rural areas of the Kathmandu Valley as in the other districts of the Bagmati Zone. Only six crops account for the crops sector of the valley. Table 2.2, provides the forecasted area under these crops over the period (1991-95). The results indicate that, under the current state of technology in the valley, the area under all types of crops is expected to decline over time, with the exception of potatoes and maize. Based on the trends, millet and oilseed crops are gradually being phased out of production in the valley. This could be a result of urban expansion or of the substitution of high-value crops, such as vegetables, in place of oilseed and millet. On the whole, the total cropped area in the valley is expected to decline by 1.6 per cent per annum over this period. About 37 per cent of the total cultivated land in the valley is estimated to be under irrigation. The irrigated area is assumed to increase at an annual rate of two per cent.

The fertiliser use rate in the valley is believed to be higher than in any other district in the country. The total sales reported by the Agricultural Inputs Corporation (AIC) in the valley divided by the total cropped area provide an estimate of availability per cropped area, and this was found to be over four times higher than the use rate. The high discrepancy between use rate and availability may be due to the fact that the present use rate reported seriously underestimates the use rate in the valley; second, fertiliser application

on the other crops, such as a vegetables (not included in the present exercise), could be considerable; and third, a significant proportion of the fertiliser sales in the valley actually finds its way into other districts as well.

The yield rates of most crops in the valley are relatively higher than the national average and those observed for other districts of the Bagmati Zone, primarily due to a relatively favourable access to other modern inputs and infrastructure. The forecasted yields of crops in the valley are reported in Table 2.3. The highest growth rate recorded is for paddy, followed by wheat and potatoes.

Despite the relatively higher growth rates for paddy and wheat yields, the average growth rates in production of these crops have been found to be lower than those of potatoes because of the declining trend in the area under these crops over time. Table 2.4 shows the projected trend in the production of different crops in the valley.

Table 2.5 shows the forecasted gross margin for different crops. The observed values of gross margin for most crops, apart from millet and oilseed, are generally higher. The average growth rate in gross margin is found to be the highest for paddy and the lowest for maize and wheat. The negative growth in the gross margins of oilseed and millet can be explained by the rapid decline in areas covered by these crops.

Livestock Sector

Livestock forms an integral part of the farming system in the rural Kathmandu Valley, as in most other districts of the Bagmati Zone. The method of livestock population projection has been described already in the previous chapter. Table 2.6 presents the projected trend in livestock population by type of animal. The average annual growth rate of almost all types of animals in the valley is less than one per cent, with the exception of pigs and chickens. As a result, the projected trends in the production of livestock products do not appear to be encouraging (Table 2.7). Table 2.8 shows that the average annual growth rate in gross margin from livestock varies greatly by types of livestock, ranging from 8.8 per cent for cows to 17 per cent for pigs. On the whole the net income from livestock enterprises in the valley has been estimated to increase from Rs 111.9 million in 1991 to Rs 175.6 million in 1995 with an average growth rate of about 12 per cent per annum. Buffaloes contribute a significant proportion of the livestock income.

Food Balance

Per capita demand for different food items has been estimated separately for rural and urban areas. As indicated earlier in the previous chapter, the demand for food is assumed to be influenced by the relative food group prices and income. The total demand for food in the valley (i.e., rural plus urban food demand) has been subtracted from the total food production (edible form) in the valley to arrive at the overall food balance situation.

Table 2.9 shows the projected trend in per capita demand for five different food items in the rural valley. The result indicates a declining trend in the consumption of all types of food items, with the highest decline recorded for meats followed by vegetables (i.e., potatoes). Note that only domestic production is being considered. The situation in per capita food consumption levels for urban households is, however, slightly different. The per capita consumption of urban households is relatively higher than that of the rural households, especially in the case of vegetables and oils and fats, while the opposite is the case for other food items. The forecasted food consumption in the urban area also shows a declining trend, but it is lower than that observed in rural areas (Table 2.10).

The total demand for food in the valley, which is the sum of rural and urban food demands, has been subtracted from the total food production (edible form) in the valley to arrive at the overall food balance situation in the valley. This is presented in Table 2.11. As can be seen from this table, the valley experiences acute shortages of almost all food items, especially cereals. Cereals will be discussed later. Vegetable and milk deficits tend to decrease as the supply position of these food items improves over time.

Import

The extent to which many food items are imported into or exported from the valley is determined endogenously by the model based on estimates of the magnitude of the food demand and supply balance. Table 2.12 shows that the value of food import in the valley will increase from Rs 1,594.5 million in 1991 to about Rs 2,261 million in 1995 with an annual growth rate of about nine per cent. The average annual growth rate in imports varies greatly by type of food. The per capita value of food imports in the valley is forecasted to increase by 5.3 per cent per annum, which is very close to the urban population growth in the valley.

The import demand for non-food items in the valley is assumed to be influenced by population growth, income growth, and income elasticity of non-food demand as specified in the methodology. The value of non-food imports has been derived separately for rural and urban areas, and the results are presented in Table 2.12. The results indicate that the value of non-food imports in the urban area is about 2.5 times higher than in rural areas, but the value of non-food imports in rural areas increases at a faster rate (4.6%) than in urban areas (2.6%). The per capita value of non-food imports in urban areas is expected to decline at an annual rate of 2.3 per cent, while that in rural areas is expected to increase by 2.6 per cent per annum. The declining trend in per capita value of non-food imports in urban areas can be partly explained by a negative growth of real per capita income in urban areas, and this will be described later.

Energy Demand Household Sector

Rural Households

Firewood is the chief energy source used by rural households for domestic purposes. As in the other districts of the Bagmati Zone, the demand for firewood has been projected under the constant per capita consumption level assumption and is allowed to grow over time as the population grows. A similar method has been used to project the demand for fodder and timber in the rural areas of the valley. The supplies of fuelwood, fodder, and timber, on the other hand, have been projected using the constant yield assumption as specified in the methodology.

Table 2.13 presents the projected demands and supplies of fuelwood, fodder, and timber in the rural areas of the valley. The details on projected supplies of fuelwood and fodder originating from different sources are shown in Tables 2.14 and 2.15. The total consumption of firewood in the rural valley has been projected to increase from 298.46 MT in 1991 to about 322.1 MT in 1995, with an annual growth of about two per cent. About 34 per cent of the fuelwood demand in the rural area is currently met by the existing supply of fuelwood in the valley. The results indicate that the growth in demand is higher than the growth in supply. As a result, the magnitude of fuelwood deficit in the rural valley is expected to rise considerably over time, and it has been estimated that, by the year 1995, less than one-third of the fuelwood requirements of rural households will be met by the supply of fuelwood in the valley. Since a large part of this deficit would have to be met through overexploitation of forests, this has grave implications for environmental damage. The deficit is likely to become even larger when the demands

for fuelwood by urban households and demands by the manufacturing sector in the urban area are also taken into account.

Urban Households

In the urban areas of the valley, other forms of fuel besides fuelwood are also consumed by households. These are primarily electricity and kerosene. Electricity is mostly used for lighting and to a lesser extent for cooking. Kerosene is in demand for cooking. The demand for these types of energy in urban areas is assumed to be influenced by the growth in population and income as indicated in the previous chapter. Not all households use all three types of energy, but some may use all three types. Furthermore, as income increases over time, urban households are expected to switch from fuelwood to commercial energy forms such as electricity and kerosene. These factors have been well considered and allowed for in forecasting the urban households' demand for energy. Table 2.16 presents the forecasted demand for energy by urban households. The result shows that the quantity of fuelwood consumed by urban households is expected to decline at the average rate of 5.5 per cent per annum, while electricity consumption will rise by over six per cent per annum over the period from 1991-1995. The demand for kerosene is expected to increase as well but by a lower percentage than the demand for electricity.

The demand for electricity in urban areas is relatively more sensitive to changes in income than demands for fuelwood or kerosene. For example, a 10 per cent increase in income levels in the urban area will lead to an increase in demand for electricity by more than six per cent, whereas the same percentage increase in income will increase the demand for firewood and kerosene by less than three per cent only. However, it has not been possible to model the effects on demand due to the electricity rationing currently being implemented in Nepal. This rationing has most likely led to substitution effects resulting in more consumption of kerosene and fuelwood.

Energy Demand: Manufacturing Sector

A detailed study on the energy demand structure in the manufacturing sector was conducted and is presented as a separate report. A translog cost function was employed to estimate the energy demand parameters for the manufacturing sector, and these national level parameters have been used to forecast the demand for six different types of energy, viz, wood, diesel, petroleum, kerosene, electricity, and coal, in the manufacturing sector inside the Kathmandu Valley. The basic assumption made is that irrespective of the type and location of the manufacturing entities, the energy demand parameters for Nepal are identical across the manufacturing sectors. The share of energy consumed by the manufacturing sector located in the three districts of Kathmandu, Lalitpur, and Bhaktapur and reported in the CBS (1986/87) was used to derive the base consumption level of the different types of energy consumed by the valley's manufacturing sector. The forecasting equation used for this purpose takes into account both the own and cross-price effects of different types of energy used in the industrial sector. Energy price projections required for this purpose have been described above.

Table 2.17 provides the forecasted demand for different types of energy in the manufacturing sector inside the valley. Electricity, wood, and diesel are the three most important forms of energy consumed in the manufacturing sector. The total quantity of wood used in this sector has been projected to almost double to 317 thousand MT in 1995 from 172.3 thousand MT in 1991, with an average annual growth rate of over 16 per cent. The total electricity demand in the manufacturing sector is expected to increase by about seven per cent per annum, diesel consumption is projected to increase by less than two per cent, and the demand for kerosene in industry is expected to decline by one per cent over the projected period. The relatively higher growth of wood demand in the manufacturing sector can be explained by the

presence of a large number of wood-intensive industries such as carpets and rugs. The details of the energy-use pattern by types of industries and energy budget shares are described in a separate report.

Energy Demand : Transport Sector

The transport sector is another large consumer of energy. A large portion of the petroleum products imported is consumed by this sector. Similarly, electricity consumption by trolley and ropeway are also substantial. The projected demand for different types of energy in the transport sector inside the Kathmandu Valley is presented in Table 2.18. The total consumption of electricity by trolley buses was estimated to be 2,024 thousand mwhr in 1991, and this is projected to grow at the rate of about nine per cent over time. The average annual growth rate of petrol and diesel consumption in this sector has been estimated to be three and five per cent respectively between 1991 and 1995. Aviation fuel demands on the other hand are expected to grow at the rate of one per cent per annum. The details are presented in Table 2.18.

Total Energy Demand in the Valley

Total energy demand in the valley consists of the sum of energy consumption in the household sector, manufacturing sector, and transport sector. Table 2.19 presents the forecasted demand for different types of energy in the valley over the period from 1991-1995. On the whole, wood consumption in the valley has been projected to increase from 500.6 thousand metric tonnes in 1991 to 662.2 thousand MT in 1995, whereas electricity consumption is expected to rise from 2,541,916 thousand Kwhrs in 1991 to about 3,380,996 thousand Kwhrs in 1995. Both demands for wood and electricity are expected to grow at an annual average growth rate of over seven per cent during the period from 1991-1995. The demand for diesel and petrol will rise at a relatively higher rate than for kerosene and aviation fuel.

The total cost of energy import by type of energy in the valley is presented in Table 2.20. The total energy import bill for the valley amounted to Rs 709.1 million in 1991 at current prices. Excluding aviation and other minor fuels, diesel (46%) and petrol (45%) account for almost 90 per cent of the value of imports. Kerosene accounted for about eight per cent in 1991. Between 1991 and 1995, the average annual growth rate in value of petrol imports is expected to be the highest (9.5%), followed by diesel (8.3%) and kerosene (3.8%). On the whole, the total import bill for the valley is expected to rise by about 8.5 per cent per annum. Also reported in Table 2.20 is the per capita value of energy imports which is projected to rise from Rs 1,197 in 1991 to Rs 1,365 in 1995 in nominal terms - an increment of little over three per cent growth per annum.

The consumption of energy and rising trend over time also has severe consequences for the quality of the environment inside the valley. Already, pollution, resulting from vehicular emissions in the valley, has become serious. With a growth in energy demand, this situation is likely to become worse unless actions to moderate vehicular emissions are not immediately taken.

Sectoral Employment Growth

Employment projections have been made separately for the rural and urban areas within the Kathmandu Valley. While the rural employment projection in the valley follows a similar method as was adopted for other districts of the Bagmati Zone, the sectoral employment projections in the urban valley are based on a combination of historical performance (growth) of sectoral GDP, given the lack of adequate information. The detailed procedures and simplifying assumptions used to derive the base employment figures and their growth have already been described in the methodology.

Rural Employment

Rural labour supply in the valley is determined by the size of active population and the normal duration of work. Based on the inter-census growth assumption (Table 2.21), the size of active population in the rural valley is projected to grow at a slightly lower rate (1.8%) than the growth in rural population (about 2% p.a.). The constant normal duration of work as reported by NRB (1988) (i.e., 250 mandays) was employed to forecast the total supply of rural labour force in the valley. The total labour use in rural areas generated by the model were then compared with the estimated rural labour force to arrive at the rural labour utilisation rate. Table 2.22 shows the forecasted labour supply and the labour use situation in the rural areas inside the valley.

The agricultural sector absorbs over 93 per cent of the total labour force in the rural areas of the valley and its ability to employ a growing labour force is expected to gradually decline. The non-agricultural sector on the other hand employs about 20 per cent of the rural labour force in the valley. Total labour use in the rural areas of the valley in 1991 has been estimated to be about 89.62 million mandays, which is significantly higher (about 1.3 times greater) than the estimated rural labour force (66.1 million mandays) in the valley. Less than 15 per cent of the rural employment is in the off-farm sector. In contrast to other districts of the Bagmati Zone, where an excess supply of labour exists, the rural employment situation in the valley exhibits a shortage of labour. It is important to emphasise here that about 52 per cent of the rural population in the valley are economically active compared to about 68 per cent in other districts of Bagmati Zone. The relatively lower size of active rural labour force in the valley, together with the fact that a large number of people commute to urban areas for employment, partly explains the existence of a labour shortage in the rural valley. Furthermore, if participation rates are taken into account, the rural areas already have a labour shortage. Thus, the rural employment situation in the valley is reasonably better than that observed in other rural districts of the Bagmati Zone. The result, however, shows that the rural labour balance situation in the valley is expected to deteriorate marginally, as the growth in active population increases at a faster rate than the growth in the labour utilisation rate.

Urban Employment

The manner in which the sectoral employment in urban areas is forecasted has been discussed in the methodology. The 1988 Multipurpose Household Budget Survey and the CBS (1992) sample estimate were used to derive the base employment figures by type of industry and occupation in the urban valley, and these base figures were further adjusted to take into account the changing structure of urban employment between these two periods. The growth rate in employment for the broad categories of workers and/or sectors are assumed to depend on a combination of historical performances of sectoral GDPs.

Table 2.23 reports the projected number of urban labour force employed in eight different sectors (e.g., agriculture, manufacturing, electricity, service sectors, etc.). The total supply of labour force in the urban valley is estimated to increase from 330,072 in 1991 to 401,358 persons in 1995, with an average rate of about five per cent per annum. About 19 per cent of the total urban labour force in 1991 were being absorbed into the agricultural sector, 17 per cent into manufacturing (including industry, not stated, or other), 28 per cent in the service sector (public plus private), nine per cent in trade and tourism-related sectors, and the rest in the construction (4%) and power (i.e., electricity) sectors. On the whole, about 77 per cent of the labour force in the urban valley is estimated to be employed. The labour balance situation in the valley, however, deteriorates over time at the rate of about 1.61 per cent and, by the year 1995, the urban sector is expected to absorb only 72 per cent of the labour force. This is because the

size of economically active population in the urban valley is expected to grow at a faster rate than sectoral employment generation.

The employment pattern in the valley shows that out of a total labour force of 254,150 estimated to be employed in the urban valley in 1991, about one-fourth of these were in the agricultural sector, 22 per cent in manufacturing (including industry not stated), 36 per cent in the service sector, 12 per cent in the trade and tourism-related sectors, and the rest in construction (5%) and electricity. Table 2.23 also shows the average annual growth in employment generation in different sectors over the projected period.

Urban employment in the agricultural sector, however, is seen to decline over time at an average rate of 2.9 per cent per annum. Despite the positive real agricultural GDP growth, there is a decline in agricultural employment in urban areas. The employment generation in all other sectors shows a positive trend over time, despite some variation in their growth rates.

Employment growth is seen to be highest (11.8%) in the electricity sector, despite its fairly low share in total employment, and it is found to be the lowest in the private service sector. Employment generation in the service sector, particularly in the public sector, is expected to grow by an average rate of over six per cent per annum, a rate similar to that observed in the construction sector. Currently these two sectors alone contribute about 40 per cent of the total urban employment, absorbing about one-third of the labour force. Similarly the growth rate in employment in the tourism-related sector is roughly the same as in the manufacturing sector (4.5%). When the labour force employed in industries not stated or other are also included in the manufacturing sector, this sector alone contributes over 22 per cent of the total urban employment. In this respect, this sector will continue to remain the second largest employer of the urban labour force next to the service sector.

Table 2.24 further shows the projected urban employment for broad categories of workers. The result indicates that over 15 per cent of the labour force employed in urban areas were engaged as labourers in the manufacturing sector, 13 per cent as administrative workers, 11 per cent as service workers, and the rest as sales and service workers, or clericals and professionals. With the exception of agriculture, which shows a declining trend in employment, the growth rate in employment in the other broad of occupational categories is found to be positive, ranging from four to about six per cent per annum. The details are presented in Table 2.24.

Income

Rural Income

Rural households derive their income from crops, livestock, and off-farm employment. It is to be noted that a significant portion of the rural income also comes from miscellaneous sources, such as pensions and remittances, and it has not been possible to estimate income from these sources. Hence the rural income estimated from the model can be believed to be slightly underestimated. The NRB study indicates that income from miscellaneous sources constitutes about 19 per cent of the total income.

Table 2.25 presents the projected nominal income from different sources for the valley's rural areas. Over two-thirds of the total rural income in 1991 is estimated to come from agriculture and the rest from off-farm employment. Rural incomes from the crop and livestock sectors are expected to grow by over 11 per cent compared to about 8.9 per cent growth in the non-agricultural sector. Per capita income in the rural valley has been estimated to rise from Rs 2,207 to Rs 3,260 at an annual rate of about 10 per cent over the period from 1991-1995. In real terms, per capita income is expected to grow at the rate of a little over two per cent.

Urban Income

Urban households derive income from various sectors, and they are estimated based on the sectoral employment estimates discussed earlier. The base figures for sectoral and occupational income have been derived using the information reported in NRB (1988) which have been adjusted to reflect income for 1991. The growth in sectoral income in the valley is assumed to be determined largely by the historical performance of the different sectors. The detailed procedures used to forecast the sectoral and occupational incomes in urban areas are stated in the methodology.

Table 2.26 presents the projected trend in the income in the valley's urban area. The total urban valley income was estimated to be Rs 4,137.48 million in 1991 and is expected to grow at the annual rate of about 11.5 per cent. About 16 per cent of the total urban income in 1991 is estimated to come from agriculture, 12.5 per cent from manufacturing, 10 per cent each from the service and tourism-related sectors (i.e., trade, hotel, etc), eight per cent from the electricity and water, 14.3 per cent from construction and transport, and the remaining 29 per cent from other industries not stated. The income from agriculture in the urban valley is expected to grow at a relatively lower rate (3.9%) than the income growth in other sectors for which the nominal income growth is likely to be 12 per cent.

Table 2.27 provides further estimates of urban income by major occupational group. Administrative workers receive over one third of the urban income whereas the share of income accruing to other broad categories of workers ranges from five per cent (clerical and sales' workers) to 16 per cent (agriculture). The manufacturing and service workers account for about 13 per cent each of the total income. The growth rates of income for all occupational groups are expected to grow by over 11 per cent, with the exception of agricultural workers for which the growth is less than four per cent per annum.

Per capita nominal income in the urban areas of the valley is estimated to increase from Rs 6,982 in 1991 to Rs 8,889 in 1995 at the rate of 6.22 per cent per annum. Despite such a high growth in per capita nominal income, urban households are likely to suffer from the rising inflation rate. In real terms, the urban per capita income (at 1991 constant prices) is estimated to decline at an annual average rate of 1.34 per cent.