6. EFFECTS AND IMPACTS OF APP IMPLEMENTATION

6.1 General Impact

The last two chapters assessed the implementation status of programmes focusing on inputs (investments) and outputs (programmes implemented) in the agriculture sector, in general, and the priority input and output sectors identified in the APP, in particular. In this chapter, an attempt is made to trace the effects and impacts first at the macro level and then at the meso and micro levels, respectively. Effects are realized in terms of changes in production and productivity of the crops, livestock, high value commodities and agribusiness sectors. Meanwhile, impacts of increased production and productivity come in the form of changes in the country's food security position, its poverty level as well as in its environmental conditions. Effects can be traced quantitatively even if the programmes are implemented over just a short period. Tracing impacts, in contrast, requires a longer period of time. Therefore, a numerical assessment of impacts is not attempted.

Macrolevel effects are assessed in terms of changes in the production and productivity of crops, livestock, horticulture and agribusiness sectors at the national level. Mesolevel effects are evaluated using the same parameters at the regional level, through changes in the price structure in the economy and in the structure of trade. Microlevel effects are evaluated using similar parameters at the village and households levels.

6.2 Macrolevel Effects

6.2.1 Changes in area, production and productivity of annual crops

Table 6.1 presents the status of Nepal's major crops in terms of area, production and yield during the pre-APP and post-APP periods. The area planted to paddy, maize and wheat, annual food crops prioritized under the APP, grew by 0.19 percent annually while production and yield rose by 2.98 percent and 2.78 percent, respectively, in the post-APP period compared with the base period (i.e., pre-APP, 1996/97). Among the cereals prioritized, growth in area covered was highest for maize (0.96 percent) followed by paddy (0.30 percent) while it was negative for wheat (-0.99 percent). The positive area growth traces mainly to an expansion of the area under irrigation (4.3 percent/annum).

Annual production growth was highest for paddy (3.25 percent) followed by maize (3.03 percent) and wheat (1.95 percent). Yield growths, meanwhile, were modest for all the priority cereals. Yield of paddy and wheat increased annually by about 2.94 percent and 2.06 percent, respectively, while that of wheat grew by 2.97 percent. Yield increases for paddy and wheat is the combined effect of increased irrigated area and increased supply of fertilizers[45].

Achievements of food crops in terms of production growth, although positive and modest, were lower than targeted under the Ninth Plan. Similarly, yield performance has been lower than planned

[45] Average fertilizer supply in 1997 and 1998 was 3 percent higher than the average in 1995 and 1996 (Table 4.3).

except in the case of potato, which is also a priority crop, and wheat (see Table 3.1 and 3.2 for yield growth targets). Area covered by potato and production and yield of the crop grew annually by 2.61 percent, 7.14 percent and 4.41 percent, respectively, in the post-APP period. Further details are presented in Appendix Table 33.

Table 6.1: Change in area, production and yield of APP crops

	Paddy	Maize	Wheat	Cereal	Potato
Average area (000 ha)					
Pre-APP period	1 504	793	660	2 957	108
Post-APP period	1 525	811	645	2 982	120
Annual growth in area (%)					
Pre-APP period	0.96	0.26	2.08	1.02	4.58
Post-APP period	0.30	0.96	-0.99	0.19	2.61
Average production (000 mt)					
Pre-APP period	3 645	1 324	1 042	6 011	948
Post-APP period	3 899	1 411	1 115	6 425	1140
Annual growth in production (%)					
Pre-APP period	3.68	-1.07	5.83	2.98	11.03
Post-APP period	3.25	3.03	1.95	2.98	7.14
Average yield (mt/ha)					
Pre-APP period	2.42	1.67	1.58	2.03	8.74
Post-APP period	2.56	1.74	1.73	2.15	9.50
Annual growth in yield (%)					
Pre-APP period	2.69	-1.32	3.67	1.94	6.17
Post-APP period	2.94	2.06	2.97	2.78	4.41

Note: Pre-APP implies growth in 1996/97 over 1995/96 and post-APP implies growth in 2000/01 over 1996/97.
Source: SINA, MOAC (1994/95 to 2000/01).

The performance of non-APP crops in terms of annual growth, production and yield is presented in Table 6.2. The area planted to millet and barley declined along with production of these cereals. While yield of millet declined, that of barley managed to grow by about 0.98 percent. Although there was a slight decline in the growth in area covered by pulse crops, the production and yield of pulses grew by about 2.11 percent and 2.78 percent annually in the post-APP period.

Table 6.2. Change in area, production and yields of non-APP crops

Particulars	Millet	Barley	Pulses	Oilseed	Sugarcane
Average area (000 ha)					
Pre-APP period	260	37	312	184	46
Post-APP period	262	31	307	188	53
Annual growth in area (%)					
Pre-APP period	-0.06	-10.46	0.20	-1.56	3.44
Post-APP period	-0.01	-5.45	-0.65	0.86	2.12
Average production (000 mt)					
Pre-APP period	286	39	219	118	1 599
Post-APP period	289	33	230	121	1 902
Annual growth in production (%)					
Pre-APP period	2.49	-11.25	3.79	2.81	3.86
Post-APP period	-0.58	-4.52	2.11	2.57	2.09
Average yield (mt/ha)					
Pre-APP period	1.10	1.04	0.70	0.64	35.07
Post-APP period	1.10	1.05	0.75	0.64	36.02
Annual growth in yield (%)					
Pre-APP period	2.55	-0.88	3.59	4.44	0.41
Post-APP period	-0.57	0.98	2.78	1.69	-0.02

Source: SINA, MOA (1994/95 to 2000/01).

Among the cash crops, positive growth was observed in area coverage and production of both oilseeds and sugarcane. While yield of oilseeds increased annually by about 1.69 percent, sugarcane yield declined slightly by -0.02 percent. Further details are presented in Appendix Table 34.

6.2.2 Changes in area, production and productivity of horticultural crops

6.2.2.1 APP priority high value commodities

Table 6.3 summarizes achievements made in the first four years of APP implementation with respect to the area expansion programme of priority HVCs against targets set by the Ninth Plan . The plan had targeted an annual increase in area for citruses (by 5.7 percent), apples (1.7 percent) and vegetables (2.1 percent).

Table 6.3: Achievements in area expansion of HVC

(In 000 ha)

	Average situation		Growth rate (%)	
	1995-96	**1997/98-2000/01**	**Achieved**	**Targeted**
Citrus	9.15	10.95	6.25	5.72
Apple	2.97	3.23	2.91	1.72
Vegetables	145.44	149.09	1.77	2.1

Source: SINA, MOAC (1994/95 to 2000/01).

In the first four years of APP implementation, productive area planted to citruses and apples increased by about 6.25 percent and 2.91 percent, respectively, thus exceeding targets. For vegetables, area coverage increased by only 1.77 percent, falling short of the target by roughly 0.3 percentage points. Failure to expand vegetable area as planned traces to the sudden drop in vegetable area from about 150 000 ha in 1997/98 to about 141 000 ha in 1998/99, a figure that picked up only slowly in 1999/2000 and 2000/01 (Appendix Table 35). This is blamed on the problem of untimely winter rains during the first two years of APP implementation.

Table 6.4 similarly presents achievements in production and productivity of priority HVCs during the first four years of APP implementation (with further details in Appendix Table 35). During the plan period, targeted production increases were 7.1 percent, 1.96 percent and 5.4 percent respectively for citruses, apples and vegetables while yield increases were 1.1 percent, 0.2 percent and 3.0 percent for the said crops. Production achievements exceeded planned amounts only for apple, for which both area and yield exceeded targets. For citrus, despite besting the yield target, annual production fell short of the aim by 0.15 percent because of the failure to attain planned area expansion. In the case of vegetables, production targets were not met due to the shortfall in achievements of both targeted growth in area coverage and yield tracing to problems related to the timing of winter rains.

Table 6.4: Achievements in production of HVC under the APP

	Average situation		Growth rate (%)	
	1995-96	**1997/98-2000/01**	**Achieved**	**Targeted**
Fruits and vegetables (000 mt)				
Citrus	90.82	111.08	6.95	7.10
Apple	27.9	31.03	2.69	1.96
Vegetables	1 342.37	1 483.67	5.05	5.4
Honey (mt)	60.0	134	26.78	7.2
Silk (mt)	21.3	24	6.40	51.4

Source: SINA, MOAC (1994/95-2000/01).

Average annual production of silk, estimated at about 21.3 mt in pre-APP period, increased to about 24.0 mt in the post-APP period, corresponding to an average annual growth rate of 6.4 percent,

which is far less than the growth targeted in the Ninth Plan (51.4 percent). In the case of honey, production grew annually by about 26.8 percent as against 7.2 percent targeted under the Ninth Plan.

6.2.2.2 Other horticultural crops

Production of fruits other than citruses and apples was targeted to grow annually by about 2.35 percent during the Ninth Plan period. Similarly, during the plan period, the aim was for tea, coffee, cardamom and spice production to grow annually by about 7.8 percent, 23.2 percent, 1.1 percent and 0.6 percent, respectively. Average annual achievements in the first four years of the plan period are presented in Table 6.5.

Table 6.5: Achievements in production of other horticulture crops

	Average situation		Growth rate (%)	
	1995-96	**1997/98-2000/01**	**Achieved**	**Targeted**
Other fruits (000 mt)	361	340	0.32	2.35
Tea (mt)	2 814	4 809	23.93	7.80
Coffee (mt)	33	66	28.04	23.20
Cardamom (mt)	NA	5 648	18.43	1.10
Spices (mt)	NA	108 726	6.80	0.59

Source: SINA, MOAC (1994/95-2000/01).

Except for fruits under consideration (which do not include apples and citruses), achievements in production generally exceeded annual growth targets of the Ninth Plan. Meanwhile, an average of 5 648 mt of cardamom and 108 726 mt of spices (i.e. ginger, turmeric, garlic and chili) were produced annually between 1997/98 and 2000/01. Further details can be found in Appendix Table 36.

6.2.3 Changes in the production of livestock products

6.2.3.1 APP priority products

Milk, meat and poultry eggs are the livestock commodities prioritized for development by the APP and the Ninth Plan. The latter has set a target of increasing the production of milk, meat and poultry eggs by about 5.56 percent, 6.22 percent and 7.22 percent annually, respectively, during the plan period[46]. Table 6.6 provides a glimpse of the production status and trends in the livestock sector in the pre- and post-APP periods together with the growth rates envisaged by the Ninth Plan.

[46] The Interim APP targets are somewhat lower, at about 4.16 percent, 4.52 percent and 5.06 percent, respectively, for milk, meat and poultry. The plan however does not provide growth targets for different years of the plan period.

Table 6.6: Changes in milk, meat and egg production in the post-APP period

Livestock products	Average situation		Annual growth (%)	
	Pre-APP period	Post-APP period	Actual	Targeted
Milk (000 mt)	987	1 086	2.66	5.56
Meat (000 mt)	168	187	2.75	6.22
Eggs (million)	410	472	4.74	7.22

Source: SINA (different volumes), MOAC, HMG, Nepal.

Annual milk production in the country increased from an average of 987 000 mt in the pre-APP period to about 1 086 000 mt in the four years after the implementation of the APP, equivalent to an average annual growth of 2.66 percent. In the milk production sector, performance lagged behind the planned amount by about 2.90 percentage points. In a similar manner, achievements fell below targets for both meat and egg production. These items were targeted to rise by about 6.2 percent and 7.2 percent annually, respectively, in terms of output but instead grew by only 2.75 percent and 4.74 percent. Failure to achieve the set goals stemmed mainly from a corresponding failure to achieve targets for breed improvement and grass distribution under the Ninth Plan. Further details are presented in Appendix Table 37.

6.2.3.2 Non-APP products

Wool and fishery are the two livestock sector programmes not given priority by the APP. Table 6.7 presents the performance in terms of output of the wool and fish subsectors during the first four years of Ninth Plan implementation. Production of fish increased annually by about 6.91 percent against the set target of 8.6 percent. On the other hand, production of wool declined annually by about 0.40 percent. Further details are presented in Appendix Table 38.

Table 6.7: Growth in wool and fish production

Livestock products	Average situation		Annual growth (%)	
	Pre-APP period	Post-APP period	Achieved	Envisaged
Fish (mt)	10 879	13 523	6.91	8.56
Wool (mt)	621	617	-0.40	NA

Source: SINA, 1998/99, MOAC, HMG/N.

6.2.4 Performance of the agribusiness sector

Table 6.8 presents the trend of growth in the establishment of agriculture- and forest-based small-scale industries indicated by the number of units registered and associated capital investments. The number of agro- and forest-based industries registered in the country as well as capital investments in the fiscal years of 1994/95 to1997/99 exhibits an increasing trend based on the units registered in the first

eight months. A marked decrease occurs in 1996/97, but a positive trend reappears the following year. The direction reverses, however, in 2000/1.

Table 6.8: Growth in agriculture and forestry-based industries

Fiscal year	Numbers	Investment (Rs million)
1994/95	8 519	5 370
1995/96	9 650	7 220
1996/97	8 196	6 040
1997/98	9 650	8 960
1998/99	9 990	9 620
1999/00	10 127	10 340
2000/01	9 980*	7 303

* Figures are for first 8 months only

Source: FNCCI, 2001.

In 2000, the Planning Division of the MOAC compiled information on the status of agricultural entrepreneurs all over the country. As stated in the preamble of the published report, this was an attempt to establish a roster of such entrepreneurs to provide support to the APP strategy and programmes of the Ninth Plan for the agriculture sector. The purpose is to help consolidate interrelationships between and among the agricultural entrepreneurs and the farmers and thereby enhance the industrialization process, which is at the core of the Ninth Plan strategy[47].

Based on the information provided in this document, this study attempts to analyse the trends in the development of agro-industries in the country between the pre- and post-APP periods. The industries have been grouped into two broad categories – production-based and service-oriented enterprises. Relevant information is presented in Table 6.9.

Table 6.9: Growth in agro-industry by sectors

Industry Type	Base period	Pre-APP		Post-APP	
		Number	Growth (%)	Number	Growth (%)
Production	136	182	16.9	239	15.6
Service	43	47	4.6	53	6.4
Total	179	229	13.9	292	13.7

Note: Here post-APP period refers to 1997/98 and 1998/99.
Source: MOAC, 2000.

From the limited information, it can be seen that growth at the national level remained steady at about 14 percent during both the pre- and post-APP periods. There appears to have been a slight decrease

[47] This was however not updated as planned.

in production-oriented enterprises and a corresponding increase in service-oriented types, though the differences are not very high. With the limitations of MOA's efforts in terms of coverage, it can however be inferred that no significant thrust seems to have been placed in promoting agro-enterprises after APP implementation at least in the districts covered by the compilation exercise.

6.3 Mesolevel Effects

6.3.1 Changes in area, production and yield of annual crops

As mentioned earlier, the effects of APP implementation are traced in this study through changes in production of APP priority outputs. These are paddy, maize and wheat among cereals; potato among tuber crops; citruses and apples and vegetables among horticultural crops; and milk, meat and eggs among livestock products. Small and medium-sized enterprises based on agricultural products are the entities focused on by the APP. In the following subsections, changes in the production levels of these commodities at the regional and ecological belt levels are presented by commodity.

6.3.1.1 Paddy.

Changes in area covered and production and yield of paddy in the post-APP period compared with the pre-APP period are summarized in Table 6.10 with further details in Appendix Table 39. Paddy production and yield were targeted to grow by about 6.2 percent and 5.61 percent annually at the national level[48] during the first five years of plan implementation. Since the APP does not provide growth targets by development region or ecological belt, assessment of effects at the mesolevel have been made with reference to the national target.

Table 6.10: Changes in area, production and yield of paddy by development region and ecological belt

Development region/Ecological belt	Pre-APP period			Post-APP period			Annual growth (%)		
	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)
EDR	477	1 047	2.2	499	1 292	2.59	0.75	3.84	3.07
CDR	427	984	2.3	438	1 171	2.67	-1.34	3.62	5.02
WDR	277	617	2.23	298	710	2.38	1	2.49	1.47
MWDR	141	318	2.26	153	393	2.56	1.42	3.84	2.38
FWDR	131	286	2.19	136	333	2.44	1.06	0.62	-0.44
Nepal	1 453	3 253	2.3	1 525	3 899	2.56	0.3	3.25	2.94
Mountain	43	78	1.83	47	90	1.93	5.53	6.23	0.66
Hill	344	720	2.09	376	900	2.4	0.85	3.06	2.19
Terai	1 066	2 455	2.3	1 103	2 909	2.64	-0.11	3.21	3.32

Source: SINA, MOAC (1994/95 to 2000/01).

[48] These targets refer to priority paddy programme areas only.

Paddy exhibited growth in terms of area, production and yield in the post-APP period compared with the pre-APP period, save for area coverage in the central region and the *Terai* and yield in the far western region. Among the five development regions, growth in area was higher than the national average in all the regions except for the CDR (-1.34). In the same period, the production growth rate was found to be high in development regions except for the FWDR where the rate was lower by more than 2 percentage points than the national rate.

Among ecological belts, production growth was faster than the national growth rate only in the mountain areas where paddy production grew annually by 6.23 percent in the post-APP period. Yield growth however was higher than the national rate in the eastern (3.07 percent) and central regions (5.02 percent). Meanwhile, yield growth has been higher than the national rate only in the *Terai* (3.32 percent compared with 2.94 percent for the nation). Higher growth rate in production and productivity of paddy in the *Terai* compared with other regions owes to favourable conditions for paddy cultivation in the area as against the hills and mountains.

6.3.1.2 Maize.

Table 6.11 summarizes the changes in area coverage, production and yield of maize in the post-APP period compared with the pre-APP period with further details in Appendix Table 40. Maize production was targeted to grow by about 4.1 percent annually in the first five years of plan implementation, but grew by only by 3.0 percent. Similarly, maize yield was targeted to grow by about 6 percent but increased by just 2.06 percent annually.

Table 6.11: Changes in area, production and yield of maize by development region and ecological belt

Development region/Ecological belt	Pre-APP			Post-APP			Growth rate (%)		
	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)
EDR	196	318	1.62	204	350	1.72	3.21	5.59	2.30
CDR	215	378	1.76	217	409	1.89	-1.18	1.40	2.62
WDR	197	312	1.59	198	330	1.67	0.22	3.56	3.33
MWDR	123	207	1.68	143	241	1.68	2.55	4.60	1.99
FWDR	51	88	1.71	50	82	1.64	-0.64	-5.75	-5.14
Nepal	782	1 303	1.67	811	1 411	1.74	0.96	3.03	2.06
Mountain	60	92	1.52	72	113	1.58	8.14	9.02	0.81
Hill	547	879	1.61	566	968	1.71	0.68	3.73	3.02
Terai	175	332	1.90	173	330	1.90	-1.07	-0.92	0.15

Source: SINA, MOAC (1994/95 to 2000/01).

Both production and yield growth were positive in all the development regions except for the far western region where production and yield declined annually by about 5.75 percent and 5.14 percent,

respectively. Both production and productivity of maize generally expanded for the country's ecological zones except for the *Terai* where production declined annually by about 0.92 percent.

6.3.1.3 Wheat.

Changes in area coverage, production and yield of wheat in the post-APP period in relation to the pre-APP period are presented in Table 6.12 with further details in Appendix Table 41. Wheat production in the first five years of plan implementation increased by 1.95 percent annually or lower than the targeted rate of 4.3 percent. However, wheat yield grew by 2.97 percent, exceeding the national target of 2.97 percent. Both production and yield growth were positive in all regions, exceeding national rates except in the case of the central, western and midwestern regions. Growth rates in production and yield were highest in the FWDR, which is likely the effect of high growth in the irrigation sector. Production growth rates were positive and higher than the national rate in the mountains and the hills, but not in the *Terai*, where annual growth in yield was seen to be lower than the national rate.

Table 6.12: Changes in area, production and yield of wheat by development region and ecological belt

Development region/Ecological belt	Pre-APP			Post-APP			Growth rate (%)		
	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Yield (mt/ha)	Prodn. (mt)	Area (000 ha)
EDR	115	185	1.61	113	198	1.75	-2.88	0.01	2.97
CDR	199	323	1.62	198	361	1.83	-1.04	1.40	2.47
WDR	123	186	1.51	125	214	1.71	0.44	2.54	2.09
MWDR	120	160	1.33	120	194	1.61	0.00	2.82	2.82
FWDR	86	109	1.27	89	147	1.65	-1.72	4.18	6.01
Nepal	643	963	1.50	645	1115	1.73	-0.99	1.95	2.97
Mountain	42	51	1.21	47	63	1.35	2.05	5.07	2.96
Hill	235	319	1.36	240	377	1.57	0.38	2.13	1.74
Terai	366	594	1.62	359	674	1.88	-2.25	1.56	3.90

Source: SINA, MOAC (1994/95 to 2000/01).

6.3.1.4 Potato.

Table 6.13 presents the changes in area covered by and production and yield of potato in the post-APP period compared with the pre-APP period with further details in Appendix Table 42. Potato production, which was targeted to grow by about 6.2 percent annually in the first five years of APP implementation, grew by 7.14 percent while potato yield, targeted to grow by about 1.3 percent, grew by 4.41 percent exceeding national targets.

Table 6.13: Changes in area, production and yield of potato by development region and ecological belt

Development region/Ecological belt	Pre-APP			Post-APP			Growth rate (%)		
	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Area	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Prodn.	Area (000 ha)
EDR	38	302	8	43	394	9.14	1.28	6.45	5.11
CDR	33	320	9.66	40	435	10.97	2.52	8.86	6.19
WDR	13	97	7.69	16	134	8.30	5.62	8.30	2.55
MWDR	12	103	8.51	14	127	8.84	1.16	1.76	0.59
FWDR	6	48	7.73	7	50	7.46	7.88	10.17	2.12
Nepal	101	870	8.61	120	1140	9.50	2.61	7.14	4.41
Mountain	21	171	8.09	23	196	8.35	0.61	3.16	2.53
Hill	52	421	8.03	56	529	9.44	0.73	5.39	4.62
Terai	28	278	9.84	40	415	10.26	4.34	11.03	6.42

Source: SINA, MOAC (1994/95 to 2000/01).

Growth of both production and yield were positive in all development regions, even exceeding national rates in a number of cases (except with regard to production in the eastern and midwestern regions and yield in the western, midwestern and far western regions). Similarly, both production and yield growth remained positive in all the three ecological belts. Production growth was lower than the national rate in the mountains and the hills. Yield growth, however, was lower than the national rate only in the mountain regions.

6.3.2 Changes in area, production and yield of high value crops[49]

6.3.2.1 Citrus.

Changes in productive area, production and yield of citruses in the post-APP period compared with pre-APP period are presented in Table 6.14 with further details in Appendix Table 43. Citrus production was targeted to grow by about 7.1 percent annually in the first five years of plan implementation but grew by 6.6 percent. Citrus yield was similarly targeted to grow by about 1.1 percent but it grew by only 0.42 percent at the national level.

[49] Regional dimension of other high value crops such as apiculture and sericulture has not been attempted due to lack of data. Since tea is concentrated in the eastern region and coffee in western region, national data reflect the regional situations.

Table 6.14: Changes in area, production and yield of citruses by development region and ecological belt

Development region/Ecological belt	Pre-APP			Post-APP			Growth rate (%)		
	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Area	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Prodn.	Area (000 ha)
EDR	2.4	22.8	9.62	4.2	43.5	10.4	5.83	6.72	0.84
CDR	2.6	26.9	10.23	2.8	28.9	10.2	5.25	6.64	1.33
WDR	2.5	25.6	10.36	5.1	53.3	10.5	6.59	6.15	-0.41
MWDR	1.0	9.1	9.08	2.0	18.5	9.3	6.46	6.77	0.29
FWDR	0.7	6.4	9.46	1.0	9.7	7.3	6.89	7.74	0.79
Nepal	9.2	90.8	9.91	15.1	153.8	10.2	6.13	6.58	0.42
Mountain	0.7	5.8	8.41	1.4	12.3	7.2	8.05	10.20	1.99
Hill	8.4	84.8	10.06	13.7	140.7	10.3	5.89	6.24	0.33
Terai	0.0	0.3	6.86	0.1	0.9	8.4	14.64	13.66	-0.85

Source: SINA, MOAC (1994/95 to 2000/01).

Area growth remained positive in all the regions and ecological belts and was highest in far western region among development regions and in the *Terai* among the ecological belts. Production as well as yield growth exceeded national rates in all the regions except in the western region reflecting HMG/N's targeted priority areas for citrus development. Similarly, growth in production and yield remained positive in all the three belts, with the increase in yield highest in the mountains.

6.3.2.2 Apple:

Table 6.15 highlights the changes in productive area, output and yield of apples in the post-APP period in relation to the pre-APP period with further details in Appendix Table 44 . The target for apple production in the first five years of APP implementation was set at about 1.96 percent annually, but actual production reached 2.7 percent . Targeted yield growth was about 0.21 percent, but actual yield declined by 0.21 percent indicating a high growth rate in productive area planted to the crop. Area growth remained positive in all development regions and ecological belts, though the growth was revealed to be highest in the MWDR and the hills. Production growth exceeded national rates only in the mid and far western development regions, however, and yield decline was worst in the far western region. Production growth remained positive in all the ecological belts while yield growth remained positive and above the national rate in the hills.

Table 6.15: Changes in area, production and yield of apples by development region and ecological belt

Development region/ Ecological belt	Pre-APP			Post-APP			Growth rate (%)		
	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Area	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Prodn.	Area (000 ha)
EDR	0.52	4.60	8.77	0.53	4.72	8.94	0.96	1.03	0.08
CDR	0.57	5.27	9.10	0.58	5.71	9.85	0.83	0.82	-0.01
WDR	0.53	5.12	9.54	0.55	5.27	9.67	1.07	1.05	-0.02
MWDR	0.98	9.59	10.86	1.12	10.87	9.75	5.03	4.99	-0.04
FWDR	0.38	4.01	9.70	0.46	4.45	8.66	5.26	3.30	-1.87
Nepal	1.87	18.32	9.55	3.23	31.03	9.62	2.91	2.69	-0.21
Mountain	1.10	10.28	10.09	2.06	19.84	8.55	3.45	3.04	-0.39
Hill	2.98	28.60	9.74	1.17	11.19	9.60	1.98	2.06	0.08

Source: SINA, MOAC (1994/95 to 2000/01).

6.3.2.3 Vegetables.

Table 6.16 presents the changes in area coverage, production and yield of vegetables in the post-APP period vis-à-vis the pre-APP period. Actual production of vegetables grew by about 5.10 percent annually in the first five years of APP implementation, which is not far from targeted growth of 5.4 percent. Similarly, actual yield of vegetables rose by about 3.27 percent compared with 3.0 percent growth planned for under the APP. Further details are shown in Appendix Table 45.

Table 6.16: Changes in area, production and yield of vegetables by development region and ecological belt

Development region/ Ecological belt	Pre-APP			Post-APP			Growth rate (%)		
	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Area	Area (000 ha)	Prodn. (mt)	Yield (mt/ha)	Prodn.	Area (000 ha)
EDR	36	314	8.72	38	353	9.39	1.71	4.76	3.01
CDR	66	651	9.86	64	659	10.30	0.36	3.03	2.66
WDR	20	185	9.25	22	224	10.03	1.64	5.61	3.91
MWDR	17	146	8.59	19	186	9.97	4.34	10.32	5.74
FWDR	5	46	9.20	6	62	9.63	10.30	14.39	3.71
Nepal	145	1 342	9.26	149	1 484	9.96	1.77	5.10	3.27
Mountain	7	52	7.43	8	66	8.56	3.63	6.89	3.14
Hill	53	510	9.62	53	542	10.20	3.00	5.55	2.47
Terai	85	780	9.18	88	877	9.93	0.81	4.67	3.83

Source: SINA, MOAC (1994/95 to 2000/01).

In all the development regions and ecological belts, growths were recorded with regard to area, production and yield of vegetables. Among the development regions, production and yield growth exceeded national rates specifically in the western, midwestern and far western regions. Among the ecological belts, production growth rates in the mountains and the hills remained higher than the national rates while in the *Terai*, these remained lower. Yield growth on the other hand bested national rates both in the hills and the *Terai*. Commercialization efforts in vegetable production appear successful in view of the high growth in production and yield in all development regions and ecological belts.

6.3.3 Changes in the production of livestock products

6.3.3.1 Milk.

Changes in the production of milk in the post-APP period compared with the pre-APP period are presented in Table 6.17 with further details in Appendix Table 46. In the first five years of APP implementation, milk production was targeted to rise by about 5.6 percent yearly, but grew by only 2.7 percent. Milk production, however, recorded growth in all development regions and ecological belts.

Table 6.17: Changes in production of milk by development region and ecological belt

(In 000 liters)

Development region/ Ecological belt	Average situation		Annual growth in the post-APP period (%)
	Pre-APP period	Post-APP period	
EDR	213	246	4.29
CDR	277	296	2.25
WDR	267	286	1.45
MWDR	112	128	4.13
FWDR	118	129	1.84
Nepal	987	1,086	2.66
Mountain	83	89	2.16
Hill	567	610	1.98
Terai	337	387	3.87

Source: SINA, MOAC (1994/95 to 2000/01).

Among the development regions, production growth was highest in the eastern region (4.29 percent) followed by the midwestern, central and far western regions. Among the ecological belts, growth was revealed to be highest in the *Terai* followed by the mountains and hills. Failure to reach the national growth target is positively related to the shortfall in the achievement of targets for breed improvement, grass seed distribution and vaccination programmes (Table 5.5) as well as annual investments (Table 5.6). This can also be inferred from the milk production growth pattern in intensive livestock development areas where annual milk production grew at higher rate than in other areas. For example, milk production in the Third Livestock Development Project areas amounted to 4.5 percent compared with 3.6 percent in other areas (see Appendix Table 47).

6.3.3.2 Meat.

Changes in the production of meat in the post-APP period vis-à-vis the pre-APP period are outlined in Table 6.18 with further details in Appendix Table 48. In the first five years of APP implementation, the growth target for meat production was placed at about 6.2 percent annually, but actual output increased by about 2.75 percent. Output expanded in all development regions and the ecological belts. Among the development regions, growth was highest in the far central region (3.58 percent) followed by the far western (3.36 percent), eastern (2.79 percent), midwestern (2.33 percent) and western regions (1.42 percent). Among the ecological belts, growth was fastest in the *Terai* (3.68 percent) followed by the hill (2.28 percent) and the mountain (1.60 percent) areas.

Table 6.18: Changes in production of meat by development region and ecological belt

(In 000 mt)

Development region/ Ecological belt	Average situation		Annual growth in the post-APP period (%)
	Pre-APP period	Post-APP period	
EDR	38.5	43.70	2.79
CDR	52.9	59.68	3.58
WDR	34.5	37.34	1.42
MWDR	25.5	27.67	2.33
FWDR	16.5	18.86	3.36
Nepal	168	187.26	2.75
Mountain	15.2	16.04	1.60
Hill	90.2	100.02	2.28
Terai	62.5	71.20	3.68

Source: SINA, MOAC (1994/95 to 2000/01).

The inability to meet national growth targets is a result of a corresponding failure to achieve targets set for breed improvement, grass seed distribution, vaccination programmes (Table 5.5) and annual investments (Table 5.6). This can also be inferred from the trend in meat production growth in intensive livestock development areas where annual meat production grew at higher rates rate than in other areas. For example meat production in Third Livestock Development Project areas grew annually by about 4.6 percent against 4.4 percent in other areas.

6.3.3.3 Eggs.

Table 6.19 summarizes the changes in production of eggs in the post-APP period compared with the pre-APP period with further details in Appendix Table 49. In the first five years of APP implementation, egg production was targeted to grow by about 7.2 percent annually, but actual output grew by just 4.74 percent. Egg production recorded growth in all the development regions except the western region and in all the ecological belts.

Table 6.19: Changes in production of eggs by development region and ecological belt

(In millions)

Development region/ Ecological belt	Average situation		Annual growth in the post-APP period (%)
	Pre-APP period	Post-APP period	
EDR	75.74	91.06	2.61
CDR	187.18	234.52	8.13
WDR	76.56	72.90	-0.15
MWDR	53.24	55.87	2.27
FWDR	17.71	18.06	2.09
Nepal	410.43	472.41	4.74
Mountain	30.08	2.67	5.04
Hill	219.90	4.31	2.22
Terai	160.44	11.08	1.38

Source: SINA, MOAC (1994/95 to 2000/01).

Among the development regions, production growth was highest in the central region (8.13 percent) followed respectively by eastern (2.61 percent), midwestern (2.27 percent) and far western regions (2.09 percent). Among the ecological belts, growth was highest in the mountains (5.04 percent) followed respectively by hills (2.22 percent) and the *Terai* (1.38 percent). Egg production growth appears to be linked more with urbanization.

6.3.4 Changes in the agribusiness sector

Variations in the number of agro industries by development regions and ecological belts in the post-APP period compared with the pre-APP period are presented in Table 6.20. A closer look at the data reveals that the overall trend masks some very important regional disparities.

Growth rates in the eastern and central development regions appear quite reasonable, exhibiting an increasing trend, particularly with regard to production-oriented enterprises. Comparing the pre- and post-APP periods, there appear to be quite significant declines in growth rates of both enterprise types in the western development region, there.

In the midwestern development region, exceptionally high growth was observed in case of production-oriented enterprises. This indicates a good start from a practically non-existent state during the pre-APP period, though the trend appears to be leveling off quickly in the post-APP period. The far western development region seems to be highly deprived in terms of agro-industries, as there was no enterprise at all in the earlier periods while just two were established during the latter period. In the service-oriented category, an enterprise has yet to be established in the area. Appendix Table 50 gives an overview of the production trends of different manufactured commodities related to agriculture.

Table 6.20: Growth in agro-industry

Region	Base Period	Pre-APP		Post-APP*	
		Number	Growth rate (%)	Number	Growth rate (%)
1. Production-oriented enterprises					
EDR	8	10	12.5	16	30.0
CDR	101	121	9.9	152	13.0
WDR	25	39	28.0	47	10.0
MWDR	1	11	500.0	21	45.0
FWDR	0	0		2	
Total Prod.	136	182	16.9	239	15.6
2. Service-oriented enterprises					
EDR	13	13	0.0	13	0
CDR	9	13	22.2	17	15.0
WDR	4	4	0.0	4	0
MWDR	15	15	0.0	17	7.0
FWDR	0	0		0	0
Total Serv.	43	47	4.6	53	6.4
Total	179	229	13.9	292	13.7

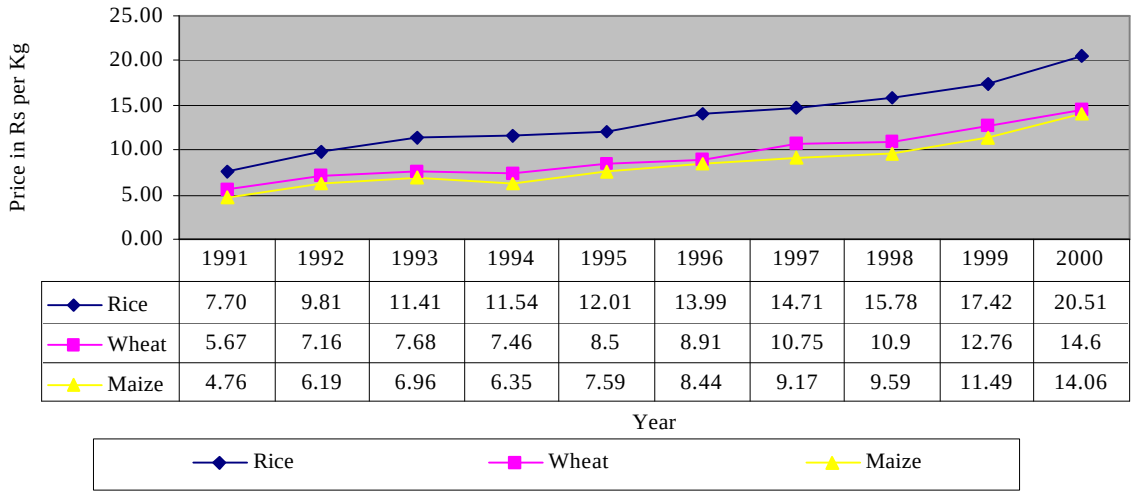
*In this case post-APP period refers to first two years of APP implementation
Source: MOAC, 2000.

6.3.5 Changes in the price structure

6.3.5.1 Prices of fertilizers and cereals.

For a given level of demand, changes in the production structure of the economy triggers changes in the price structure through their effects on the supply situation. In order to evaluate the mesolevel effects of changes in the aggregate production of selected agricultural commodities targeted by the APP, the price trend is hence analysed. The average national annual retail price trends of rice, wheat and maize are presented in Figure 6.1.

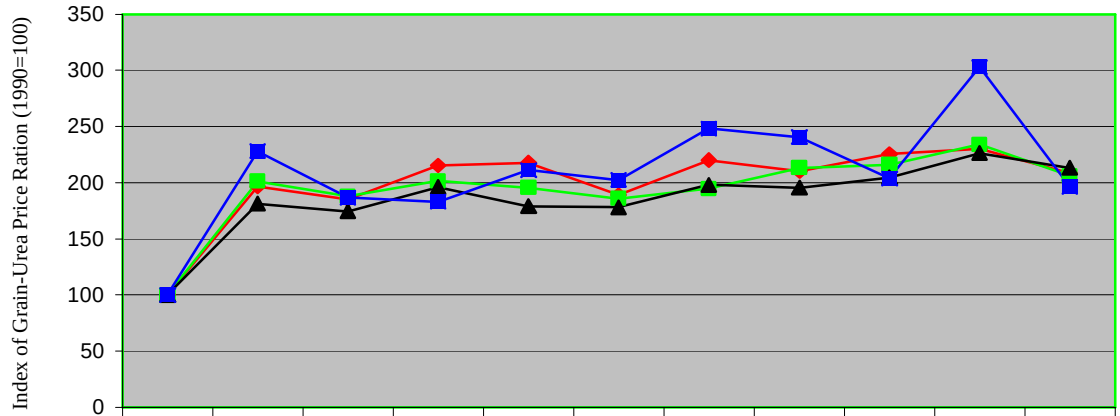
Figure 6.1: Movement of National Price of Cereals



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Rice	7.70	9.81	11.41	11.54	12.01	13.99	14.71	15.78	17.42	20.51
Wheat	5.67	7.16	7.68	7.46	8.5	8.91	10.75	10.9	12.76	14.6
Maize	4.76	6.19	6.96	6.35	7.59	8.44	9.17	9.59	11.49	14.06

Between 1991 and 2000, average retail prices of rice, wheat and maize in the country increased steadily reaching Rs 20.51 for rice, Rs 14.60 for wheat and 14.06 for maize in 2000/01. Over the period, prices increased annually by about 11.5 percent, 11.08 percent and 12.9 percent for rice, wheat and maize, respectively. To assess how prices of major foodgrains have moved over time in comparison with the price of urea, which is the most dominant fertilizer used in the country, the movement of grain-urea price ratios (which serves as an index) between 1990 and 1999 is tracked and analysed. The results are presented in Figure 6.1a (with detailed information contained in Appendix Table 45).

Figure 6.1 (a): Movement of Grain-Urea Price Ratio



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Rice	100	197	185	215	218	189	220	210	225	230	209
Wheat	100	201	188	201	196	186	195	213	216	234	206
Maize	100	181	174	196	179	178	198	195	204	227	213
Potato	100	228	187	183	211	202	248	240	204	303	196

Information presented in the figure show that the rice-urea price ratio has increased – from 100 in 1989/90 to 209 in 1999/2000 – indicating favourable movement of output-input price ratios. A similar trend has been observed in the case of wheat, maize and potato. The index has fluctuated more in the case of potato than in the case of cereals. For all crops, conditions in 2000/01 remained relatively unfavourable compared to 1999/00.

In Table 6.21, average retail prices and annual growth of prices of rice, wheat and maize in Nepal are presented along with corresponding figures for the major fertilizers, while allowing comparisons between pre- and post-APP periods. In the first four years of APP implementation, prices of urea, potash and DAP, which are the main fertilizers used in Nepal, grew annually by about 11.54 percent, 3.67 percent and 13.08 percent, respectively.

Table 6.21: Changes in cereal and fertilizer prices

	Fertilizer price (Rs/kg)			Cereal price (Rs/kg)		
	Urea	**DAP**	**MOP**	**Rice**	**Wheat**	**Maize**
Average (1995-96)	6.16	16.88	8.50	13.00	8.71	8.02
Average (1997-2000)	8.53	19.26	11.63	17.11	12.25	11.08
Annual growth (1997-2000, in %)	11.54	3.67	13.08	10.04	13.14	13.61

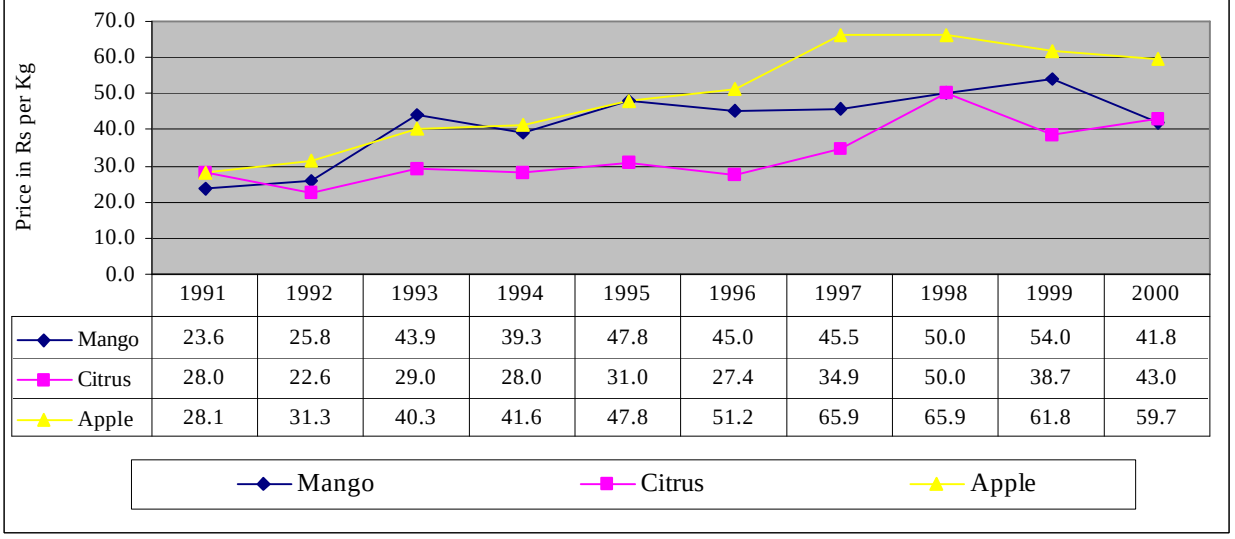
Source: Computed from AMIB-Special Issue, MDD, DOA, 2002.

During the same period, average national retail prices of rice, wheat and maize increased by 10.04 percent, 13.14 percent and 13.61 percent, respectively. In relative terms, price increases generally favoured producers, as these were larger for most of the cereals than for fertilizers, indicating favourable prices.

6.3.5.2 Prices of fruits and vegetables.

Figure 6.2 depicts the annual retail price trend of fruits – mangos, citruses and apples – in the country. Between 1991 and 2000, average prices of fruits increased steadily, reaching Rs 41.8 per kg for

Figure 6.2: Average Annual Retail Price of Fruits in Kathmandu



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Mango	23.6	25.8	43.9	39.3	47.8	45.0	45.5	50.0	54.0	41.8
Citrus	28.0	22.6	29.0	28.0	31.0	27.4	34.9	50.0	38.7	43.0
Apple	28.1	31.3	40.3	41.6	47.8	51.2	65.9	65.9	61.8	59.7

mangos, Rs 43.0 per kg for oranges and 59.7 per kg for apples in 2000/01. Over the period, prices of these fruits correspondingly increased by about 6.6 percent, 4.9 percent and 8.7 percent annually.

Table 6.22 presents average retail prices and annual growth prices of mangos, oranges and apples alongside the same figures for major fertilizers in both the pre- and post-APP period facilitating comparison. In the first four years of APP implementation, average retail prices of oranges and apples increased annually by 11.9 percent and 3.9 percent, respectively, in Nepal. Although the average price of mangos in the post-APP period exceeded that in the pre-APP period, prices declined annually by about 1.8 percent in post-APP period compared to the pre-APP period due to a sharp decline in mango prices in 2000/01[50].

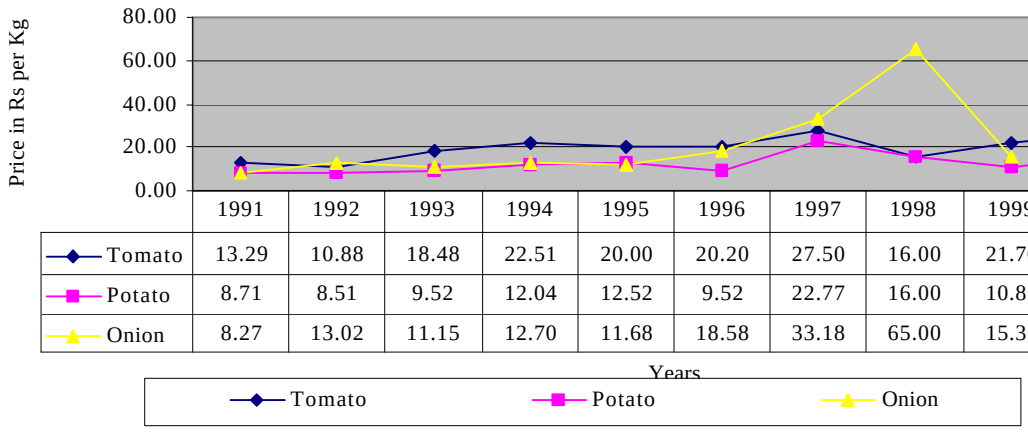
Table 6.22: Changes in fruit prices

	Cereal price (Rs/kg)		
	Mango	**Citrus**	**Apple**
1995-96	46.4	29.2	49.5
1997-2000	47.8	41.7	63.3
Annual growth (%)	-1.83	11.93	3.91

Source: Computed from AMIB-Special Issue, MDD, DOA, 2002.

The average national annual retail price trends of the country's main vegetables (tomato, potato and onion) are presented in Figure 6.3. Between 1991 and 2000, average retail prices of these commodities increased steadily, reaching Rs 27 per kg for tomatoes, Rs 15.9 per kg for potatoes and 15.4 kg for onions in 2000/01. Over the period, prices of the respective products increased by about 8.2 percent, 6.9 percent and 8.0 percent annually.

Figure 6.3: Average Annual Retail Price of Vegetables in Kathmandu



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Tomato	13.29	10.88	18.48	22.51	20.00	20.20	27.50	16.00	21.70	27.00
Potato	8.71	8.51	9.52	12.04	12.52	9.52	22.77	16.00	10.85	15.88
Onion	8.27	13.02	11.15	12.70	11.68	18.58	33.18	65.00	15.35	

[50] Growth is computed by taking last year figure only.

Table 6.23 organizes the data on average retail prices and annual growth prices of vegetables, allowing an evaluation of pre- and post-APP periods. Average prices of tomatoes and potatoes increased annually by about 7.5 percent and 13.6 percent, correspondingly, while that of onions declined by 6.17 percent. In relative terms, price increases of vegetables did not favour producers, as these were generally smaller for vegetables compared with that for major fertilizers.

Table 6.23: Changes in vegetable prices

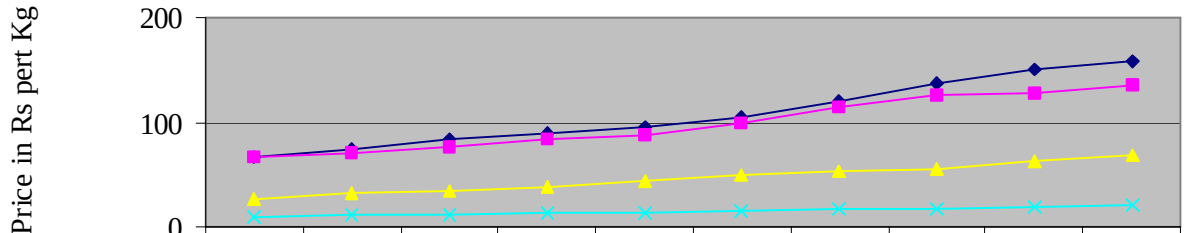
	Cereal price (Rs/kg)		
	Tomato	**Potato**	**Onion**
Average of 1995-96	20.1	11.0	15.1
Average of 1997-2000	23.1	16.4	37.8
Annual growth (%)	7.52	13.65	-6.17

Source: Computed from AMIB-Special Issue, MDD, DOA, 2002.

6.3.5.3 Prices of livestock products.

The average retail price trends of Nepal's livestock products (meat mutton, chicken and buffalo and milk) are illustrated in Figure 6.4. Between 1991 and 2000, average retail prices of these commodities increased steadily reaching Rs 159.0 for mutton, Rs 135.4 for chicken 69.5 for buffalo meat and Rs 20.3 for milk in 1998/99. Over the period, prices increased annually by about 10.14 percent, 8.14 percent, 10.9 percent and 8.72 percent for the respective products.

Figure 6.4: Average National Retail Price of Livestock P{roducts



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Mutton	66.65	75.18	84.12	89.98	96.16	105.17	120.3	137.37	151.4	158.96
Chicken	66.94	69.87	75.48	84.42	87.21	98.83	113.48	124.92	128.34	135.41
Buff Meat	27.36	31.57	34.83	37.19	43.87	49.56	53.12	54.97	63.4	69.45
Milk	9.57	11.01	11.47	12.72	13.31	14.89	16.93	17.65	19.34	20.31

The annual growth rates of retail prices of mutton, chicken, buffalo meat and milk in the post-APP period compared to the pre-APP period are shown in Table 6.24. In the first two years of APP implementation, average prices of mutton, chicken, buffalo meat and milk increased annually by about 11.6 percent, 13.4 percent, 7.7 percent and 10.7 percent, respectively.

Table 6.24: Changes in livestock product prices

	Livestock product price (Rs/kg)			
	Mutton	**Chicken**	**Buffalo meat**	**Milk**
Average of 1995-96	100.7	93.0	46.7	14.1
Average of 1997-2000	142.0	125.5	60.2	18.6
Annual growth (%)	10.88	8.19	8.80	8.07

Source: Computed from AMIB (Special Issue), MDD, 2002.

6.3.6 Changes in relative prices

Table 6.25 presents changes in the price ratios of some agricultural commodities and major fertilizers, again allowing comparisons between the pre- and post-APP periods. From the table, one can clearly see that the movement of relative prices in the post-APP period has been in favour of agricultural commodities except in the case of rice and maize, for which ratios declined annually by about 2.2 percent and 0.4 percent, respectively. This was probably because increases in rice and maize prices were smaller than the increases in the price of urea due to a reduction in urea subsidy.

Table 6.25: Changes in commodity-fertilizer price ratios

		Rice	**Wheat**	**Maize**	**Tomato**	**Potato**
Urea	1995-96	2.34	1.60	1.44	2.88	1.53
	1997-98/99	2.24	1.60	1.42	3.39	1.69
	Growth rate (%)	-2.16	0.10	-0.40	8.49	4.92
DAP	1995-96	0.85	0.58	0.52	1.04	0.56
	1997-98/99	0.89	0.64	0.57	1.35	0.67
	Growth rate (%)	2.54	4.59	4.31	13.79	9.96
MOP	1995-96	1.69	1.16	1.04	2.07	1.10
	1997-98/99	1.78	1.27	1.13	2.68	1.33
	Growth rate (%)	2.55	4.60	4.32	13.80	9.96

Source: Computed from AMIB (Special Issue), MDD, 1999.

6.3.7 Changes in the structure of agricultural exports and imports

One of the objectives of the APP is to bring about change in the structure of agricultural trade. The high growth rate of agricultural sector envisaged by the plan is expected to promote agricultural exports, particularly of those commodities prioritized by APP, and substitute imports.

Table 6.26 summarizes the changes in the structure of international trade in the post-APP period compared to pre-APP period with further details in Appendix Tables 50 and 51. Compared to the pre-APP period, total imports increased annually by about 5.1 percent in the first three years of APP implementation. Agricultural imports, which accounted for almost 7.5 percent of total imports in the pre-APP period and 8.3 percent of the total in the post-APP period, grew more than non-agricultural commodities.

Although total exports increased annually by about 30.1 percent during the same period, agricultural exports declined by about 4.1 percent. While the ratio of total exports to total import increased from 0.25 before APP implementation to 0.39 afterwards, the ratio of agricultural exports to agricultural imports declined from 0.58 in the first period to 0.34 in the second period indicating worsening agricultural trade.

Table 6.26: Changes in the structure of imports and exports

(In Rs million)

	Situation during		Annual growth (%)
	Pre-APP period	Post-APP period	
Total imports	84 293.5	95 010.7	5.07
Agricultural imports	6 222.1	7 903.3	17.71
Agricultural imports/Total imports	7.5	8.3	
Total exports	21 258.8	37 670.8	30.08
Agricultural exports	3 627.3	2 591.7	-4.10
Agricultural exports/Total exports	17.4	7.4	
Total exports/Total imports	0.25	0.39	23.81
Agricultural exports/Agricultural imports	0.58	0.34	-18.53

Source: Computed from FNCCI, 2001.

With a view to focus agricultural trade analysis on those commodities that are in the APP priority list, export-import data of these commodities are analysed and the results presented in Table 6.27. While imports of APP priority commodities increased annually by about 19.9 percent in the post-APP period compared with the pre-APP period, exports of similar commodities declined by about 12.1 percent. This indicates a deteriorating agricultural trade situation. The situation with respect to APP commodities seems to have further worsened than the situation of the general agriculture sector.

Table 6.27: Changes in imports and exports of APP commodities

(Rs million)

	Pre-APP	Post-APP	Growth (%)
Import of APP commodities	4 117.5	5 777.3	19.93
Export of APP commodities	846.6	770.6	-12.14
Export/Import of APP commodities	0.21	0.13	

Source: Computed from FNCCI, 2001.

6.4 Microlevel Effects

Attempts were made to trace the microlevel effects of changes in macro policies and priorities affecting the agriculture sector through a three-step procedure, and these were performed at three levels. In the first, effects were assessed through an intensive study of the agriculture situation of selected villages using the Participatory Rural Appraisal (PRA) methodology and by linking the findings to APP policies and priorities. In the next level, findings of the PRA study were presented to and discussed with concerned line agency personnel of selected districts and regions to determine their perception of APP policies and priorities and to find out how these were reflected and prioritized in actual district planning and resource allocation. Finally, changes in the post-APP period relating to priority inputs and outputs at the district level were assessed and compared with that in the pre-APP period.

6.4.1 Assessment of the agriculture situation of study villages

6.4.1.1 Murma Village in Mugu

Agriculture is the main occupation of the people in Murma Village. Farming is strictly of subsistence level with wheat, millet and barley serving as the major crops. Farmers follow a four-year crop rotation where they divide their individual land into four equal parts. Millet and wheat are grown in two parts of the plot while barley, pulses or potato are planted in the third part. The fourth part is usually left fallow. They would change the sequence in subsequent years until the end of the rotation in the fourth year.

Farmers keep livestock mainly for farmyard manure purposes and for transportation as a partial source of income. The number of livestock has been decreasing significantly in recent years due to the overriding priority given to the community forestry programme and the establishment of Rara National Park. The livestock herding system followed in the village is similar to the method in other mountain areas. In the summer (between the months of March and October), animals are kept in the village and used for various farm activities. In winter (November to March), these are moved to lower altitude areas for grazing, particularly to Ruga, Ruwa or Srinagar VDCs. Majority of the people in Murma (65 percent) are poor and face acute food shortages, particularly between Kartik and Jestha (October/November and May/June). Persistent food shortages coupled by declining livestock sector income have worsened food security situation, compelling young men to travel to India for work and to stay there for longer periods of time.

Residents of the village have neither heard of APP nor felt any change in the approach of the district line agency towards agriculture. In addition to the climatic constraint imposed on the village due to its location, other problems cited by villagers included scarcity of improved seeds or crops and breeds of livestock, deficiency of technical knowledge and skills, and lack of agricultural inputs (fertilizers, agrochemical and credit) and medicine for treatment against livestock diseases.

6.4.1.2 Sokat Village in Achham

Agriculture is the main occupation of the people in Sokat Village and farming is carried out at a subsistence level as well. The key crops of the area are upland rice, maize, wheat, barley and finger millet. Major cropping rotations include rice-wheat/barley, finger millet-wheat, finger millet-mustard and maize-wheat. Modern agriculture methods have not yet reached the village and not a single farm has reported use of modern crop varieties or chemical fertilizers.

People keep the livestock mainly for farmyard manure production and for livestock products such as milk and ghee. Villagers report that the number of buffaloes has been decreasing due to a shrinking feed base. Because of denuded forests and irregular rainfall, forest products and fodder for cattle have similarly become scarcer. To date, people have made no effort to protect and manage forests in a sustainable manner.

Majority of residents (almost 75 percent) are poor and face food shortages for at least six months in a year. Save for migration to India for seasonal work, no other economic opportunities for gainful employment exist in the village. Seasonal outmigration to India and the *Terai* plains of Nepal has thus become rampant.

As in Mugu, residents of Sokat have not heard of the APP nor felt any change in terms of district line agency approach towards agriculture. Lack of irrigation, a paucity of technical knowledge and skills among residents, lack of markets and road facilities, a shortage of medicines for livestock and of modern agriculture inputs and damage of the crops caused by floods are among the problems cited by both males and females in the village. These problems have persisted in the village for a long time.

6.4.1.3 Kharaula Village in Kailali

Agriculture is the main occupation of the people of Kharaula. Although agriculture is in the stage of transition from subsistence to commercial scale, cash crops such as sugarcane and sunflower still occupy only a small percentage of the total cropped area. Owing to the establishment of the Basulinge sugar factory in Chuha VDC, farmers have begun to grow sugarcane while a few have tried planting sunflowers instead of the traditional mustard crop. This switch has been triggered by the low prices of mustard and aggravated by increased aphid infestations of the crop.

A number of different crops are grown in the village. In terms of area, rice is the predominant crop and hence the cropping system is typically rice-based. Among cropping patterns, rice-wheat is most popular followed by rice-fallow and rice-pulses. Both cattle and buffalo are used as draft animals for transport and soil preparation as well as for milk production. The system is relatively independent of forest and public grazing lands, and a much larger proportion of livestock fodder comes from crop residues.

Despite good transport facilities and a robust market, the number of buffaloes in the village remains low, the reason being a lack of fodder and labour for the management of livestock. Almost 45

percent of the residents are poor, being self sufficient in food for only four to six months. This group comprises mostly small and landless households belong to the *Tharu* (*Chaudhary*) community and disadvantaged caste groups. It is common for these families to send members to work in others farm as wage labourers or even for bonded labour.

Although a few improved Nepali rice varieties (e.g. Janaki, Savitri, Pant-4, Pant 8, Kanchi Masuli and Masuli) are available, the Indian variety Sarju-52 predominates the rice growing area. This latter variety has been an important part of the village, sustaining the local economy. Many NGOs, even the Sustainable Community Development Programme (SCDP) of UNDP, had financed farmers to go to Pantnagar and bring home the Sarju-52 rice variety. Many farmers of Kharula Village said that they were not aware if Nepalese agricultural research was producing any rice variety that can replace Surju variety of rice in the near future. Except for some educated landlords, no one knew about the APP, much less its approach and priorities.

The most pressing agricultural problems perceived and faced by men and women in the village were solicited based on a pairwise ranking technique. From the exercise it was revealed that the problems cited by villagers have persisted for quite some time now. They were similar for both genders although ranking differed. For example, the women referred to the lack of appropriate agriculture tools and equipment as the second most important problem in the village whereas the men did not mention this.

The male villagers noted the lack of market facilities for their agricultural products as the most important problem. This was cited despite the village being linked with the all-weather national highway to Dhangarhi, which is the district's headquarters, and despite the presence of many *Kantas* (wholesale grain purchasers) right in the locale. When the men were asked what they meant by market, it became clear that they were referring to prices, which were controlled by Indian markets as well as their inability to influence them because of their small sales volumes. Farmers were generally worried about the low sale prices of their products.

Another marketing-related issue raised by farmers involved the seasonal variation in prices of foodgrains was also discussed as the marketing problem. The lack of irrigation facilities, credit and technical support services were also considered major obstacles, with pairwise problem identification revealing equal ranking for these three problems. However, the rarity of technical support services was given the highest priority by women while it was just the second most important problem for men.

Even with the operation of multiple credit organizations, farmers still identified the lack of credit facilities as one of the major hindrances to progress. When asked why credit was a problem for them, they claimed that group-based loans by organizations such as the SCDP and the Grameen Bank were afforded only to its members while amounts were not sufficient to finance enterprises. Also, borrowers sometimes obtain loans from one organization in order to pay another creditor. The Agricultural Development Bank of Nepal (ADB/N) provides loans but these are not timely, and it is often difficult to get funds for operating businesses.

6.4.1.4 Amahibelha Village in Sunsari

Like in the other villages studied, Belaha's economy is also dominated by agriculture. Located at a distance of less than 10 km from Biratnagar, Amahibelha represents a VDC that is rapidly moving towards commercialization of agriculture. Farmers usually grow three crops a year, with rice as the predominant crop in terms of area. The cropping system is hence rice-based with popular crop rotations being rice-rice-wheat, rice-rice-mustard, rice-rice-maize, rice-wheat-fallow and rice-vegetables-vegetables.

Due to the operation of a sugar factory in the adjoining village, sugarcane has become a popular cash crop in the area and is now grown by most big farmers. Next to sugarcane, vegetables are also common farmers. Vegetable cultivation provides cash income to rich families while for medium and small farmers it serves as one strategy for survival during the food shortage months. The DADO has identified Amahibelha as a pocket area for sugarcane and mustard planting.

Both cattle and buffalo are used as draft animals for transport and soil preparation as well as for milk production. A much larger proportion of livestock fodder comes from crop residues and the system making households relatively independent of forest and public grazing lands. Buffalo keeping is also quite popular and increasing number of private plantations partly traces to the popularity of the animals in the VDC. Majority of the residents in the village (57 percent) are poor and face food deficits for six months in a year. This group comprises mostly small and landless households that belong to the *Tharu* (*Chaudhary*) community and to disadvantaged caste groups (*Dalits*). For these families, working in other households' farms as wage labourers to earn livelihood is a common occurrence.

An investigation of the pressing problems in agriculture perceived by men and women in the village reveal differences in the types of issues faced by the two groups. While the lack of irrigation was the most pressing issue for men, this was not seen as a priority for women who reported damages of crops by the flood as the most crucial problem, thus seeking wanted immediate action and programmes to control flooding in the village. Asked to give their reactions over this issue raised by women, male participants argued that floods are not regular events and only occur occasionally. This indicates that women are more concerned with the present (e.g. the food, and the loss it entails) whereas men are more concerned with the future.

In similar manner, female villagers considered the lack of technical knowledge and skills in agriculture production as the second most important problem confronting households while the men did not even mention this. This reflects the women's lack of access to agricultural extension services. The issues raised by men mostly relate to difficulties encountered in commercializing agriculture such as the lack of irrigation, chemical fertilizers, seeds and credit and the high prices to be paid for available fertilizers. Many males participants claim they typically know more than government extension workers (i.e. the JT/JTA) but that the latter can still be of help if only they make efforts to facilitate timely provision of credit, seeds and fertilizers, which is not the case at present.

6.4.2 Linking the village agricultural situation to APP policies and priorities

In order to assess the micro effects of APP implementation, agriculture situations in villages are logically linked to APP policies and priorities by analysing changes in fertilizer supply and usage levels, the status of rural roads and electrification and in villagers' access to irrigation facilities, technology and institutional sources of credit. Results of the analysis are presented in Table 6.28.

6.4.2.1 Fertilizer.

The effect of the policy shift in the fertilizer trade from state control over procurement and distribution and granting of a price subsidy to trade deregulation and subsidy removal has been mixed. In the hills and the mountains, the change is observed mainly in terms of reduced supply levels resulting from restricted access of the private sector to the transport subsidy controlled by the AIC. However, considering the supply level of fertilizers and the size of the cultivated area in the district, which give rise to less than 1 kg per hectare of cultivated area in Mugu and about 7 Kg in Achham, the effect is insignificant. In the *Terai*, the effect seems to have been mixed. While the supply level has drastically been reduced in Kailali, it is reported to have increased in perceivable quantities in Sunsari[51] due to supplies made available by the private sector. Probably due to insignificant contribution of fertilizer to agricultural production, there has been no policy feedback through media and users in the hills and the mountains. In Kailali, the situation was different, with media as well as the public raising their voices against government policy, believed to have created fertilizer shortages. Shortages reportedly occurred as AIC cut back its operations because of expected private sector activity in the western, central and eastern *Terai*, which did not materialize. Private sector groups importing fertilizers officially had less incentive to operate in the midwest and far west *Terai* because of high transportation costs and the unofficial importation of low-priced Indian fertilizer. This predicament even prompted local administration in the region to close their eyes to the visible but unofficial flow of fertilizers from India.

6.4.2.2 Irrigation.

It is APP's policy to prioritize development as well as improvement and rehabilitation of small irrigation schemes in the hills and the mountains. No significant effect, however, has been observed in the study villages located in the mountains and the hills as the irrigation status of these villages hardly changed in the first two years of APP implementation[52]. However, in the *Terai* where the APP focus on irrigation has been on groundwater development through STWs, the results have been mixed. In Kailali Village, for example, farmers report a decrease in STW installation, from about 20 STWs in 1996/97 to about 10 in 1997/98 in the VDC, with subsidy on STW installation declining from 60 percent to 40 percent. Many farmers in the village fear that the number of STWs installed per year in the VDC might further decline when the government eliminates subsidies on STW completely by year 1999*. In the case of Sunsari Village, the VDC lies within the command area of the Sunsari Morang Irrigation Project and is therefore not a priority area for STW installation.

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[51] The official estimate of average annual fertilizer supply in Sunsari district in 1997 to 1998 was lower than the corresponding figure in 1995 to 1996 by about 1 600 mt.

[52] The findings of the village study can be safely generalized for the two districts since no additional budgetary provisions were made in these areas in the first two years of APP implementation.

* This is consistent with STW loan application with ADB/N – Appendix Table 54

Policies are communicated from the macro to the meso level via government circulars, which are written once the policy is formally adopted. At the micro level, meanwhile, agents obtain the information only when they approach the concerned institutions to seek institutional support. For example, farmers approaching the ADB/N offices in Kailali and Kanchanpur district knew about government's policy of complete removal of the subsidy on STWs only when they approach banks to apply for an STW loan. Many of these villagers returned without applying for the loan when they were told that STWs no longer benefit from state subsidy (The Kathmandu Post, 20 September 2000). Except for media and trimester progress reports of the concerned institutions, no other mechanism exists for micro-meso-macro policy feedbacks. It was also observed during the field study that, preparedness at the meso and micro levels, the government lacked in terms of dealing with the likely effects and impacts of major macro policy changes. Clear examples are the unavailability of fertilizers with AIC in Kailali district from March to April 2000 and the lack of efforts to counter farmers' retaliation against loan applications with the ADB/N in the district.

6.4.2.3 Technology.

The effect of the shift in policy regarding technology (i.e. away from the strategy of spreading agricultural research and extension resources to a wide number of commodities to concentrating these resources to APP priority areas) has yet to manifest itself at the micro level. In all the villages studied, the state of agricultural technology after the implementation of the APP remains unchanged from the previous period.

6.4.2.4 Credit.

Access to credit from formal sources is reported to be poor in all the four villages studied. While farmers had no access to institutional sources of credit in Mugu and Achham districts, those in the *Terai* villages reportedly experienced difficulty in obtaining financing. Getting the required financing in a timely manner hence remains to be a problem except in the case of commodities for which marketing is assured and tied with the processing industry (e.g. sugarcane in Kailali and Sunsari districts). Credit flows to APP priority commodities in the post-APP period were found to be positive only for horticultural commodities in the Mugu and Sunsari districts (Appendix Table 52).

6.4.2.5 Agricultural roads and electricity.

None of the study villages had electricity. Villages studied in the Kailali and Sunsari districts, however, had access to roads leading to major markets. Road conditions have not yet visible improved in Kailali but in contrast to Sunsari, where there are visible effects in terms of expansion of vegetable cultivation (Sub section 6.4.1 and Table 26).

Table 6.28: Micro effects of APP implementation in villages studied

APP priority	Murma (Mugu)	Sokat (Accham)	Kharaula (Kailali)	Amahibelha (Sunsari)
Fertilizer	Supply drastically reduced. Fertilizers reportedly not used in the village reported at present although some report use of urea in millet in the past.	Supply reduced and use of fertilizers in the village restricted to few farmers in paddy seedling and lowland rice. The reduced supply has worsened the farm situation.	Fertilizer availability drastically reduced creating havoc in the winter while a similar situation is feared for the summer. Farmers, used to chemical fertilizer use on principal crops (e.g. rice, wheat, potato and sugarcane) forced to reduce application due to unavailability.	Farmers report increased availability of fertilizers due to the presence of private traders. Farmers in the village report increased usage levels despite price increases although some doubt product quality. Per hectare usage of fertilizer is significant in the area.
Irrigation	No irrigation available in the village and no efforts currently made to develop irrigation facilities.	Irrigation is restricted to lowlands along the Gosali Gad though farmers have constructed an irrigation channel.	Tubewell irrigation serves as the major source of irrigation. High cost (Rs 60000) despite a 60 percent subsidy makes installation unaffordable for smallholders. Installation declined from 20 last year to less than 10 this year and is expected go down further next year when the subsidy is removed.	The village is covered by a surface irrigation scheme (Sunsari-Morang Irrigation Project) and the STW programme is not yet visible. Around 50 to 60 percent of the area in the village is irrigated but this is not due to the APP programme.
Technology	Only traditional technology is used. Use of improved seeds and maintenance of improved breeds of livestock not reported. Access to extension is poor.	Technology used is traditional. Use of improved seed and maintenance of improved livestock not common while access to extension services poor. Extension agents from district line agencies have never visited the village.	Farmers in the village accustomed to adopting improved agricultural technology in the form of improved crop varieties and fertilizers. For crop varieties, farmers depend more on Indian technology than from the research system in Nepal. Agricultural extension services are poor and stagnant.	Farmers in the village are quite ahead in terms of adoption of modern seed variety and fertilizer technology. Farmers, however, report a lack of confidence in the local research system's capability to generate and provide improved technology. In the last two years, no new technology has come to the village.

Credit	No access to formal sources of credit.	No access to formal sources of credit.	Despite multiplicity of NGOs operating rural credit programmes, majority of farmers have limited access to formal sources of credit particularly for crops. This is because NGO operations are limited to financing income-generating activities with a focus on women.	Access to institutional credit is still a problem in terms of getting required amount, lengthy process and timely availability. Credit is however assured for sugarcane cultivation.
Agri. roads and electricity	The district is completely isolated and there is no electricity available in the village.	Road access is limited to district head-quarters (DHQ). Reaching the DHQ requires more than a days walk. No plan in the offing to link the village by road in near future. No electricity available in the village.	With the construction of Karnali bridge and improvement of link roads under the rural road improvement programme, the village is now integrated with the markets although there are still complaints of market-related problems particularly in relation to getting fair price. The village has no electricity and STWs are diesel operated.	With the improvement of Biratnagar Amahibelha rural road the villagers have now better access to Biratnagar markets and markets elsewhere in the country facilitating commercial cultivation of vegetables. The village is yet to be covered by rural electrification programme.
Crops	Climatic conditions restrict crop choices and crop yields remain static except for bad years when these decline drastically.	Cultivation is predominated by cereals. Traditional varieties have low yields and fluctuate depending upon the monsoon.	Agriculture is the predominant occupation of the village residents. Although agriculture has started to show signs of commercialization, it is still at the subsistence stage for the majority. Cereals predominate but sugarcane is emerging as a new cash crop while sunflower is replacing mustard cultivation.	Agriculture is the main occupation of the village residents. Agriculture in the village has gradually started moving towards commercial agriculture with vegetables and sugarcane emerging as the main cash crops.

Horticulture	No one in the village has planted fruit trees. Vegetable cultivation has just started while access to better seeds is limited to seeds brought from India by seasonal migrants.	No fruit trees are seen in the village. Vegetable cultivation, which has started recently, is limited to backyards, mainly for household consumption. The Field survey team was not able to avail of any vegetables during their visit in May.	Although traditional fruit trees can be seen in the village, fruit cultivation has yet to be launched on a commercial scale. The village has been designated as vegetable pocket area, but the integrated programme package has not yet been implemented.	The village has not yet engaged in commercial cultivation of fruits. However, commercial cultivation of vegetables has picked up momentum and is expected to grow rapidly.
Livestock	Livestock raising is still traditional. The animal population in the village has fallen due to reduced access to forest grazing and community forests in the village and elsewhere.	Livestock raising is traditional with no sign of improved breeds. The animal population has declined in recent years due to a reduced feed resource base. No fodder trees seen in the village.	Livestock raising is still traditional. Despite improved market access, commercialization in the livestock sector has yet to begin. Farmers are hesitant to increase buffaloes due to a low feed base, which is predominated by crop residues.	Livestock raising, particularly that of buffaloes for milk production and sale in Biratnagar market (DDC and open market), now becoming popular. Despite heavy dependence of livestock on the crop sector for feeds, cultivation of forages is on the rise. Poultry raising in organized manner also on an increase.
Remarks	No sign of any effects of APP implemen-tation.	No sign of any effects of APP implemen-tation.	APP implementation has some visible effects in the high value vegetable crop sector.	Effects of APP implementation are more visible in terms of commercialization of HVCs and livestock.

6.4.2.6 Changes in cropping pattern and crop productivity.

Agriculture is the main occupation in all the villages studied, and is generally of the traditional type in the mountains and the hills and in the process of modernization as well as commercialization in the *Terai* where farms have adopted HYV-fertilizer technology and have begun cultivation of sugarcane and vegetables for supply to the market. While the effect of APP implementation in the hill and mountain villages is nil, the extent to which the ongoing changes in the cropping pattern in the *Terai* villages can be linked to APP implementation is questionable except for the case of commercial cultivation of vegetables and sugarcane in Kailali and Sunsari villages. In this village expanded vegetable cultivation is the direct effect of rural road improvement carried out after the plan's implementation. Village level yield of paddy, a priority crop under the AP, is higher than the district average in the two *Terai* districts. The yield of potato, also a priority crop, is low and falls short of the district average in Kailali but is high and better than the district average in Sunsari. In the case of wheat, village level yields are in the range of 1.5 to 1.6 mt/ha.

6.4.2.7 Horticulture.

None of the villages has embarked on fruit cultivation on a commercial scale. Commercial production of vegetables, however, has been initiated in Kailali and has picked up momentum in Sunsari. These are the result of recent improvements in rural road conditions.

6.4.2.8 Livestock production.

Except for the village in Sunsari district where commercialization of buffalo milk production is on the rise, no perceptible changes have noted in the villages studied. There has been no change in the herd structure in terms of composition of improved and local breeds. In fact, livestock population in Murma (Mugu), Sokat (Achham) and Kharaula (Kailali) has reportedly decreased. In Amahibelha (Sunsari), the livestock population is said to be stable with an increased buffalo population and reduced cattle population[53].

6.4.3 Feedback from district/regional interactions

In all the district workshops[54], participants had no major comments on the presentations or the findings of the PRA, generally confirming the results. Nevertheless, many were surprised to find the reaction of the villagers towards their work in terms of low importance and relationship. Some questioned the representativeness of villages selected to reflect their work, and while eventually accepting the results,

[53] Compared to the pre-APP period, milk and meat production after plan implementation increased in Mugu, Kailali and Sunsari districts while these decreased in Achham district. Production of poultry eggs was higher in Mugu and Achham and lower in Kailali and Sunsari districts in the post-APP period compared to the pre-APP period.

[54] A district/regional workshop was organized in the three district/regional headquarters – Gamgadi of Mugu district, Dhangarhi of Kailali district and Inaruwa of Sunsari district. The district workshop could not be organized in Achham district because of the rainy season and the unavailability of majority of the district officials during the time of PRA exercise. The purpose of the district workshop was to organize a platform for the study team to present the findings of village PRAs to the district/regional authorities and examine the macro-micro policy linkages including the policy feedback mechanism, if any. Participants in the workshops included all relevant district and regional officials.

proceeded to provide their clarifications of the poor performance. Based on the discussion at the workshops, the study team made key assessments, which are listed below.

6.4.3.1 Knowledge of the APP.

Although district officials had fair knowledge about the priority inputs of the APP (i.e. irrigation, fertilizer, electricity and rural infrastructures and technology), they could hardly describe how to integrate these priority inputs to achieve the outputs envisaged by the plan. When asked to enumerate activities or projects in the district, if any, that exemplify the integration of the four priority inputs in all the study districts, none could present such examples. There remains much scope to realize the concept of an integrated pocket approach. Despite Government's many claims and statements about the implementation of APP since the last three years, most of the district authorities agreed there exists a wide gap between policy and implementation. Although the DADOs and the District Livestock Services Offices (DLSOs) had identified pocket areas under the pocket package strategy (PPS) formulated by the MOAC, these were known hardly to other related organizations. DADOs were often seen reporting the poor coordination and support of related district line agencies.

6.4.3.2 Programmes and resource allocation.

During the workshops, many participants expressed their concerns over the MOAC's instruction to allocate 60 percent of resources to the pocket areas identified under the PPS. They question the effectiveness of programme implementation at the district level in a situation where 60 percent of resources are allocated to pocket areas, which they say hardly exceed a thousand hectare[55], with only 40 percent of resources benefiting the rest of the district. Asked if budgetary resources and manpower have increased after the implementation of APP, DADOs and DLSOs and line agencies in all districts said there exist no significant differences between the budget and manpower before and after APP implementation.

Participants argued that without sufficient manpower and restructuring of the MOAC[56] and other related line agencies conform to APP programmes, achieving plan goals will not be possible. Interestingly, when many authorities were questioning the seriousness of the district officials over the implementation of the APP, district authorities even doubted the seriousness of senior officials at the regional and central level over plan implementation. Participants in all the study districts, where interactions were held repeatedly, raised the issue concerning the lack of an effective monitoring and evaluation system. In one district, some participants argued that recent decisions of the Government to liberalize fertilizer trade and remove subsidies on fertilizer and STWs were counterproductive in realizing APP targets.

6.4.3.3 Dependency on Indian technology.

Having noted the heavy influence of Indian rice varieties in far western region, questions were consequently thrown to participants about this. Interestingly, although extension officials confirmed this

[55] In Sunsari district, pocket areas identified for cereal production cover around 1 800 ha against 74 000 ha of agricultural land in the district.

[56] The MOA was restructured before the formulation of APP.

and reported lack of appropriate varieties in Nepal, the research scientists seemed to disagree with the observation. Rather, they argued that research has already recommended many appropriate rice varieties for the far western region; it is because of the poor performance of the extension workers that these have not reached to the farmers. Nevertheless, the district workshop clearly confirmed a weak research-extension linkage. While this dependency was found to be high in western *Terai*, it was very low in the eastern *Terai* and non-existent in the hills and mountains[57].

6.4.3.4 Government-NGO partnership.

The concept of developing a functional partnership between government and NGOs enshrined in APP implementation policy has yet to emerge at the local levels. Rather, some government and public sector line agencies even consider NGOs as rivals operating locally with much more incentives and facilities provided by international NGOs (INGOs) and donors[58]. Some government and public sector line agencies claim that the overrated performance of NGOs operating at local level is the result of their smaller scale operation in relation to the incentives, facilities and resources provided. They argued that if NGOs could achieve the same results with the scarcity of resources and the political interventions faced by public entities, they would support NGOs wholeheartedly. Representatives in the workshop from the NGO sector, while acknowledging the advantage of having available sufficient resources, meanwhile attributed the poor performance of government to resource mismanagement and to lack of flexibility and the transparency within public organizations as well as staff commitments. Given such observations, the study team felt that realizing the sprit of the government's economic liberalization programme to promote private and NGOs sectors and thereby reduce the state's role will be difficult unless national strategies and programmes for building effective partnerships between government and NGOs are formulated and implemented effectively. This link is still missing, mainly because of the brewing rivalry (if any) between these sectors.

6.4.3.5 Worsening food security situation.

In discussions on the worsening food security situation in Mugu, while some participants raised the issue concerning the removal of the AIC office from the district headquarters, some were against the policy of government that involved distribution food in the district on subsidized prices. The latter were of the view that food distribution through the Nepal Food Corporation (NFC) has psychologically discouraged people from producing more for sale. As long as the state continues to provide food subsidies price, they say people will prefer to wait a whole day and stand in a long queue to buy 2 kg rice rather than go to work and earn wages of Rs 60, which is sufficient to feed a family for just one day. Therefore,

[57] In the Mugu workshop, participants expressed their concern over their access to and the quality of agricultural research carried out at Jumla Agricultural Research Station. If the wheat variety developed at *Terai* situation in Bhairahawa Research Farm does not grow well in the mountain environment of Mugu district, this will become a cause of concern as Jumla station is too small in terms of resources and number of scientists and too far in distance to serve Mugu district. Many said that people are so poor in Mugu that they are not in a position to store seeds for the next year and would even eat the seeds. Therefore, they have to buy seeds every year. As improved seeds are not available in the district, farmers have to buy the local seeds available at the local market. This confirms PRA findings that none of the crop varieties grown in Murma village are improved varieties.

[58] This observation has been drawn based on reports of some government line agencies, representatives of which claim they can also perform well if they are provided with better salaries, facilities and resources as are provided to NGO workers.

people will have no incentive to produce food. They further added that developing the Karnali zone to tackle persistent food security and poverty problems requires a different approach, which implies an aggressive focus on infrastructure development, natural resource management, tourism promotion and community development to create employment opportunities.

6.5 Impacts of APP Implementation

Impacts of APP implementation can be seen in terms of improvement in food security, poverty alleviation and protection of the environment. In this subsection, these impacts are assessed quantitatively based on data available at the macro, meso and micro levels. Where quantitative figures are not available only the likely impacts are discussed.

6.5.1 Food availability and food security

6.5.1.1 Macro-level impact

Average per capita food production at the national level during the pre- and post-APP periods are presented in Table 6.29. Although average per capita cereal production decreased from about 195.6 kg of cereals per annum in the pre-APP period to about 194.4 kg per in the first four years of APP implementation, it grew annually by 0.5 percent in the post-APP period. During that time, per capita potato production grew annually by about 4.8 percent.

Table 6.29: Annual per capita food production

Commodity	Pre-APP	Post-APP	Growth rate (%)
Cereal (kg)	195.65	194.36	0.50
Potato	48.21	51.95	4.75
Fruits (kg)	19.32	20.17	2.18
Vegetables (kg)	65.61	67.75	2.76
Milk (kg)	48.92	49.58	0.38
Meat (kg)	8.42	8.55	0.47
Eggs (no)	20.37	21.56	2.42

Source: Computed based on Appendix Tables 33 to 53.

Similarly, per capita production of fruits and vegetables increased annually by about 2.2 percent and 2.8 percent, respectively. In the livestock front, average per capita production of milk, meat and eggs per annum also increased annually by about 0.4 percent, 0.5 percent and 2.4 percent in the post-APP period. This implies that at the national level, the annual rate of cereal production and hence food availability exceeded annual growth of population.

If per capita food production is considered as a proxy of food availability, the food security position of Nepal can be said to have improved in the post-APP period compared with the pre-APP period. Although all of the incremental food production cannot be attributed to the plan's implementation,

a portion of the incremental production can definitely be credited to the Nepalese government's ongoing efforts to better implement APP policy and priorities.

6.5.1.2 Mesolevel impact.

Information presented in Table 6.30 show that the improved food security situation observed at the macro level in the post-APP period was generally spread over all development regions and ecological belts although improvements varied among them. This was indicated by increased per capita production of cereals in all the development regions and ecological belts after plan implementation save for the central and far western development regions and the *Terai* belt where per capita cereal production declined slightly. Likewise, per capita production of potato recorded growth in all regions and ecological belts except in the MWDR where per capita production declined annually by about 0.5 percent.

Table 6.30: Annual per capita food production by development region and ecological belt

Development region/Ecological belt	Pre-APP		Post-APP		Growth rate (%)	
	Cereals	Potato	Cereals	Potato	Cereals	Potato
EDR	231.7	70.8	236.6	77.1	1.68	4.51
CDR	173.7	51.3	169.1	57.6	-0.04	6.06
WDR	202.3	26.9	198.1	30.7	0.58	6.24
MWDR	186.5	50.3	191.3	44.6	1.17	-0.49
FWDR	183.4	22.4	178.4	24.0	-2.21	7.27
Nepal	195.7	48.2	194.4	52.0	0.50	4.75
Mountains	118.2	116.3	129.6	120.4	5.18	1.56
Hills	157.5	49.5	161.0	54.2	0.63	3.34
Terai	244.1	36.2	235.4	39.3	-0.11	8.16

Source: Computed based on Appendix Tables 33 to 53.

In the horticultural front, per capita production of fruits recorded growth in all the development regions and the ecological belts although the rate of growth varied among regions and ecological belts (Table 6.31). Growth in per capita production of fruits was highest in the eastern region and lowest in the far western region while among the ecological belts, it was highest in the mountains and lowest in the hills.

Table 6.31: Annual per capita horticultural production by region

Development region/Ecological belt	Pre-APP		Post-APP		Annual growth (%)	
	Fruits	Vegetables	Fruits	Vegetables	Fruits	Vegetables
EDR	20.0	64.3	21	69.1	2.70	2.85
CDR	19.0	92.9	20	87.6	2.12	0.38
WDR	22.0	47.5	22	51.4	1.86	3.59
MWDR	19.0	54.2	20	65.1	2.77	7.89
FWDR	16.0	24.1	16	30	0.77	11.39
Nepal	21.3	65.6	22.3	67.7	2.40	2.76
Mountains	26.0	33.9	28	40.4	2.99	5.23
Hills	22.0	55.8	22	55.4	1.92	3.49
Terai	16.0	79.9	17	83.4	2.41	1.96

Source: Computed based on Appendix Table 33 to 53.

Similarly for vegetables, per capita production recorded growth in the post-APP period in all development regions and ecological belts. Growth in per capita vegetable production per annum was highest in the far western region (11.4 percent) and lowest in the central region (0.4 percent). Among the ecological belt, it was highest in the mountains (5.2 percent) followed by the hills (3.5 percent) and the *Terai* (about 2.0 percent).

In livestock production, growth per capita of milk and meat output grew in all the development regions and ecological belts (Table 6.32). Among the development regions, growth in per capita milk production was highest in the eastern development region (2.4 percent) and lowest in the far western development region (-0.8 percent). For meat production, growth was highest in the eastern region (0.9 percent) and lowest in the midwestern region (-0.5 percent).

Table 6.32: Annual per capita livestock production by region

Development region/Ecological belt	Pre-APP			Post-APP			Growth rate (%)		
	Milk	Meat	Eggs	Milk	Meat	Eggs	Milk	Meat	Eggs
EDR	44.8	8.3	16.9	48.1	8.6	17.8	2.39	0.92	0.74
CDR	40.0	7.7	27.4	39.4	7.9	31.1	-0.39	0.90	5.34
WDR	66.4	8.7	18.0	65.7	8.6	16.7	-0.48	-0.51	-2.05
MWDR	42.7	9.8	19.8	44.9	9.7	19.6	1.83	0.08	0.02
FWDR	63.3	8.9	9.3	63.1	9.2	8.8	-0.83	0.65	-0.59
Nepal	48.9	8.4	20.4	49.6	8.6	21.6	0.38	0.47	2.42
Mountains	53.8	9.9	19.2	54.6	9.9	17.6	0.57	0.02	-2.61
Hills	62.3	10.1	23.9	62.5	10.2	25.1	-0.01	0.29	1.85
Terai	35.6	6.6	17.2	36.8	6.8	18.9	1.18	1.00	4.00

Source: Computed based on Appendix Table 33 to 53.

In the case of eggs, annual per capita egg production recorded growth in the post-APP period compared to the pre-APP period only in the eastern, central regions and midwestern development regions. The rate was highest in the central region (5.3 percent) and negative in the western region (-2.1 percent). Among the ecological belts, per capita production of milk, meat and eggs was found to be highest in the *Terai* region and lowest in the hills for milk (-0.01 percent) and the mountains for meat (0.02 percent) and eggs (-2.6 percent).

6.5.1.3 Microlevel impact.

Changes in food security situation at the micro level in terms of per capita production of food items could not be assessed because PRA could generate data for 1998/99 only. Table 6.33, however, presents the food situation assessed by study participants in villages surveyed during the PRA exercise between April and May 2000. Information presented in the table provides clear indication of the acute food security situation in villages studied. Irrespective of their location in development regions and ecological belts, more than 75 percent of households do not produce food sufficient to feed the family for an entire year. The situation is worse in the villages surveyed in the mountains and hills in the midwest than in the *Terai* in the far western and eastern regions.

Table 6.33: Level of food self-sufficiency in villages studied

	Murma	**Sokat**	**Kharaula**	**Amahibelha**
Total households (no)	55	193	125	121
Food sufficient households (%)	5.45	17.62	17.60	24.79
Food deficit households (%)	94.55	82.38	82.40	75.21
Distribution of deficit households	100.00	100.00	100.00	100.00
9 months and above (%)	53.85	69.81	38.83	49.41
6-9 months (%)	15.38	23.27	15.53	31.76
Less than 6 months (%)	30.77	6.92	45.63	25.88

Source: PRA study of villages, 2000.
Note: Food self-sufficiency is based on household food production.

In Murma village in Mugu district (a midwestern mountain district) only about 5 percent of households are able to produce enough food to feed the family all through the year. Meanwhile, about 54 percent of food deficient households produced enough food for just three months or less. In Sokat village in Achham district (Midwest hill) and Kharaula village in Kailali (far west *Terai*), only about 18 percent of households produced sufficient food for the whole year. Food is sufficient for only up to three months for about 70 percent of food-deficit households in Sokat and 39 percent in Kharaula. In the *Terai* of the eastern region, food produced is sufficient to feed the family throughout the year for about 24 percent of households. In this village, self-produced food is sufficient for only three months or less annually for 49 percent of food deficit households.

The extent to which the self-sufficiency ratio of household produced food reflects food security situation depends upon the kind of coping strategies food deficit households adopt to feed the family in

the event of a shortage. Box 6.1 summarizes the coping strategies implemented by food deficit households in study villages facing deficits for a period of six months or more.

In general, the strategies adopted by households to cope with food deficit situations appear similar in all the four villages. These typically include seasonal outmigration of villagers to India, the sale or mortgage of property such as livestock and land, money loans, collection and sale non-timber forest products and working as labourers.

Box 6.1: Coping strategies reported by majority of food deficit households in surveyed villages

Villages Surveyed	Coping Strategies
Murma Village in Mugu District	Seasonal outmigration to India, sale of livestock, labour work, collection and sale of non-timber forest products and borrowing.
Sokat Village in Mugu District	Seasonal outmigration to India, sale of livestock, labour work and borrowing.
Kharaula Village in Mugu District	Offering of services as bonded labourer or wage worker and borrowing.
Amahibelha Village in Mugu District	Seasonal outmigration to India, sale of livestock, borrowing and mortgage of land.

Source: PRA study of villages, 2000.

When individual strategies are examined in terms of their capacity to provide assured income, one would not find among them permanent income-earning activities that can fully bridge household food shortages. Given the extent of food deficit households and uncertain income sources in villages surveyed, it can be concluded that majority of households in villages across the country face acute chronic food insecurity. Even though the growth rate of per capita food production at the macro and meso levels have trickled down to the villages quite uniformly in the post-APP period, one can think of their positive impact on household food security. However, given the size of the problem, this impact might only be minimal.

6.5.2 Impact on poverty

The APP is more of a growth-oriented plan that harnesses the agricultural potentials of the country than a plan targeted to poverty reduction. However, it may have an indirect impact on poverty alleviation through high growth fostered in the agriculture sector and the ensuing multiplier effects in other sectors of the economy. Full-scale implementation of APP is expected to reduce population to below the poverty line from about 49 percent in 1994/95 to about 40 percent in 2000/01 and further to 14 percent in 2014/15[59].

Available statistics indicate that about 42 percent of the country's population in 1995/96 fell below the poverty line and that poverty was more rampant in rural areas (44 percent) than in urban areas (23 percent). However, many other reports estimate poverty at much higher levels. For example, a study

[59] The Nepal Living Standard Survey of CBS 1996 using nutritional basis (equivalent to annual per capita income of Rs 4404) has estimated the population below poverty line to be about 42 percent.

conducted by the Agricultural Projects Services Centre (APROSC) in 1998, which covers 225 Village Development Committee areas in 15 districts scattered all over the country, estimate poverty to be around 70 percent using food self-sufficiency criteria (Appendix Table 55 and 56). This figure comes close to the study team's estimates in the four villages examined (Table 6.34). Here, the percentage of households categorized as poor and very poor by local people range from a high of 77 percent in Sokat Village in Achham district to a low of 45 percent in Kharaula Village in Kailali district.

Table 6.34: Poverty in study villages

	Murma	**Sokat**	**Kharaula**	**Amahibelha**
Total households (no)	55	193	125	121
Rich households (%)	34.55	23.32	55.20	100.00
Poor and very poor households (%)	65.45	76.68	44.80	57.02

Source: PRA study of villages, 2000.

Similar disaggregated and representative data by development region are not available. Also no reliable national level estimates on poverty exist for the period after 1996. Therefore, drawing inference on the impact of APP implementation is not possible. Moreover, one can not expect a large impact on poverty over a period of two to three years especially if programme is not geared towards poverty reduction.

6.5.3 Impact on the environment

The APP maintains that its priority programmes will have a positive impact on the environment. these stem from changes in land uses with more land devoted to high value tree crops, including tree orchards and community and private forestry. The recommendation of APP to adopt the integrated pest management and integrated nutrient management strategies in areas of high input intensity agriculture also safeguards against environmental hazards likely to emerge from modernization of the agriculture sector. Apart from poverty reduction, better land use and dispersed urbanization, APP also emphasizes environmental education to create awareness as well as impart knowledge, skills and attitudes in conservation of the environment and thereby improve environmental quality.

In the first two years of APP implementation, a total of 151 355 ha of forestland were handed over to communities for management while 463 ha of private land were converted into private forests. Meanwhile, 4 552 ha of permanent land under annual crops were brought under fruits plantation (Table 6.35). This implies that permanent tree coverage increased by a total of 156 370 ha of land, thus protecting fragile lands against erosion.

Table 6: 35: Incremental plantation areas after APP implementation

	Area (ha)
Community forestry	151 355
Private forestry	463
Fruit trees	4 552
Total	156 370

The addition of land planted to trees and fruit crops has occurred in varying degrees in all development regions and ecological belts. Incremental plantation was highest in the midwestern region and lowest in the far western region and, among the ecological belts, highest in the hills and lowest in the mountains. In addition, positive environmental impacts are now being realized from the integrated watershed management programme that has been implemented across the country. Although visible impacts are yet to be seen, the IPM strategy has been increasingly incorporated into the PPP. Further details on the issue with respect to development regions and ecological belts are provided in Appendix Table 57.