4. IMPLEMENTATION STATUS OF APP PRIORITY INPUTS

4.1 Priority Input: Irrigation

4.1.1 Implementation status of APP policy

The APP and the Ninth Plan have adopted a policy that accords top priority to the development of year-round irrigation facilities to increase food production, mainly cereals, in the *Terai* and high value commodities in the hills. While the policy emphasizes groundwater development that can irrigate areas in blocks[18] in the *Terai*, it also emphasizes development of small-scale low cost irrigation systems in places that hold potential for high value crop production, particularly in the hills. In order to remove bottlenecks in its capacity to provide subsidies on STWs and deep tubewells (DTWs), the government has adopted policy reforms involving gradual withdrawal of these subsidies. This requires scrapping subsidies provided by the public sector (i.e. 60 per cent and 30 per cent of STWs to group and individuals, respectively, by the ADB/N and 90 per cent on DTWs by the government) by 1999/2000.

Based on these policy guidelines, the ADB/N and the Department of Irrigation (DOI) have removed the subsidy on STWs effective July 2000. In its institutional reform policy, the APP has suggested the creation of a department (i.e. a Department of Shallow Tubewell and Minor Irrigation) designed to facilitate coordinated delivery of technical and financial assistance under the appropriate ministry (Nepal Interim Agriculture Perspective Plan, 1997). However, this has yet to be established. The DOI already initiated a groundwater development project beginning fiscal year 1998/99.

4.1.2 Implementation status of irrigation programmes

Irrigation development has gained priority in all the plans since the beginning of planned development efforts in Nepal. This has resulted in the development of irrigated areas of about 193 182 ha by the end of the Fourth Plan period (1974/75). Sustained emphasis on irrigation development in the subsequent plans has increased irrigated areas. Figures presented in Table 4.1 show that total irrigated area in the country increased to 1.19 million ha by the end of the plan period following the eighth plan (1996/97) and to 1.33 million ha in 2000/01. Growth rates in irrigation development prior to APP implementation remained at about 9.08 percent at the national level, 12.5 percent in the hills and mountains and about 6.6 percent in the *Terai* (Appendix Table 12 and 13).

[18] Areas identified for irrigation development in blocks through STWs are Jhapa, Siraha, Rupendehi, Kapilbastu, Kailali and Kanchanpur. Similarly, block areas to be developed for DTWs are located in the command areas of Kankai, Kamala, Bagmati, Banganga and Dundawa irrigation projects.

Table 4.1: Development of irrigation facilities, 1974/75 to 2000/01

(Area in ha)

Year	Hill and mountain	*Terai*	Farmer developed area	Total w/o farmer developed area	Total
197475	9 646	183 536	NA	193 182	193 182
1996/97	114 391	702 953	381 814	817 344	1 199 158
1997/98	126 433	712 367	381 814	838 800	1 220 614
1998/99	134 384	751 865	381 814	886 249	1 268 063
1999/2000	140 910	781 029	381 814	921 939	1 303 753
2000/01	145 380	805 801	381 814	951 181	1 332 995
Growth (1974/75-1996/97)	12.50	6.60	NA	7.11	9.08
Growth (1996/97-2000/01	6.18	3.47	0.00	3.86	2.68

Source: Computed from information provided in Economic Survey, 2001/02 MOF, 2002 and SINA of MOAC (different volumes).

The area under year-round irrigation in Nepal was targeted to increase during the Ninth Plan period from 513 000 hectares in 1996/97 to 666 000 hectares in 2001/02 (JMA/APROSC, 1997), which is equivalent to an annual increment of about 5.4 per cent during the plan period. Table 4.2 furnishes the data on the status of irrigation in the pre- and post-APP periods (details can be found in Appendix Table 14). The first two fiscal year periods, 1995/96 and 1996/97, are considered to be the pre-APP periods while the post-APP period comprises the latter four (i.e. 1997/98 to 2000/01).

Table 4.2: Changes in irrigated area between pre- and post-APP periods

Periods evaluated	Percentage annual change in irrigated areas during:
Pre-APP period	5.10
Post-APP Period	4.19
Ninth Plan target	5.40

Source: Computed from information provided in Economic Survey, 2001/02 MOF, 2002 and SINA of MOAC (different volumes).

About 42 000 hectares of additional areas were brought under irrigation annually during the pre-APP period while about 34 000 ha were irrigated in the post-APP period. These incremental areas show that irrigated areas in the country increased by about 5.1 per cent annually during pre-APP period and by 4.2 per cent during the post-APP period. The country's irrigated area increased significantly during the post-APP period but fell short of the Ninth Plan target by 0.12 percentage point. This was due to slow

progress in STW installation by the ADB/N. In the post-APP period, the irrigation developed by ADB/N grew annually by merely 4.07 percent[19].

4.1.3 Investments in irrigation

An analysis of investment in irrigation in terms of development budget allocated to the irrigation sector in the pre- and post-APP period reveals two important findings (Table 4.3). First, the level of investment in the sector in the first four years of the Ninth Plan (4.50 percent) fell short of the annual growth envisaged by the APP (6.52) by almost 2 percentage points. Second, average annual real investment in the sector during the post-APP period (Rs 2.33 billion) remained lower by almost number Rs 0.2 billion, or equivalent to a decline of 7.2 percent.

Table 4.3: Changes in pre- and post-APP periods

(Rs. billion)

Year	APP target		Development budget irrigation		Annual increment (real)
	Total	Subsidy	Nominal	Real	
1995/96	Na	na	2.88	2.67	0.12
1996/97	Na	na	2.73	2.36	-0.31
Average during pre-APP period	Na	na	2.81	2.51	-0.09
1997/98	1.82	1.54	2.44	2.03	-0.33
1998/99	1.90	1.53	2.94	2.24	0.21
1999/2000	2.10	1.71	3.04	2.22	-0.02
2000/01	2.20	1.58	3.95	2.81	0.59
Average during post-APP period	2.01	1.59	3.09	2.33	0.11
Growth in investment in post-APP	6.52	0.86	9.68	4.50	

Source: JMA/APROSC, 1997 and MOF, 2001.

However, in terms of APP targets of incremental irrigated areas and investments, areas reported to have been brought under irrigation in the first four years of APP implementation exceeded targets by about 19 per cent while actual investment exceeded targets by only 16 per cent. This was because some of the areas brought under irrigation in the first four years of APP implementation traced to the completion of ongoing projects started earlier than the Ninth Plan[20].

[19] ADB/N could finance only 1 809 STWs in 1997/98 against a targeted 3 200. Ninth Plan targets for STW installation were 3 200, 4 900, 6 600, 8 300 and 10 000 in the first, second, third, fourth and fifth years, respectively.

[20] The Interim APP projected that additional areas to be brought under irrigation in the first four years of APP implementation will amount to 114 600 ha with total investment of Rs 8.02 billion. In the first four years of APP implementation irrigation, the area increased by 135 825 ha with Rs 9.30 billion invested in irrigation.

4.1.4 Implementation status of institutional reforms

In order to smoothly implement the irrigation programme envisaged by the APP, certain institutional reforms were emphasized while preparing the first five-year plan (i.e. the Interim APP). Major reform programmes envisaged include the creation of a new Department of Shallow Tubewells and Minor Irrigation (DOSTAMI) to monitor STW development in the *Terai* and minor irrigation in the hills, delineating areas for machine drilling and hand-boring in the *Terai* and providing technical support to ADB/N's STW programme. The Ministry of Water Resources (MOWR) has already established a Groundwater Office in Chitwan for this purpose. The establishment of the proposed DOSTAMI has been postponed for the time being.

4.1.5 Major problems and challenges

Groundwater development owes largely to STWs, which account for about 53 percent the total area planned for irrigation development during the Ninth Plan period[21]. Attainment of irrigation targets set by APP thus depends largely on progress made in the STW installation. This is because surface schemes prioritized by the APP consist mainly of improvements and/or rehabilitation of small farmer-managed schemes. A number of such projects (e.g. mainly the donor-assisted NISP and SISP) are already under implementation. Meeting the irrigation development targets of APP via groundwater exploitation depends mainly on the STW installation rate, which has drastically declined in the first four years of APP. Major factors that have led to the declining rate of groundwater exploitation include limited subsidy allocation capacity of the government, low quality of STW technology, inappropriateness of existing farming practices which yield low returns to STW installation, narrow coverage due to excessive land fragmentation, lack of adequate supply of trained manpower for STW repair, inadequate credit supply and shortage of drilling facilities[22]. Attaining APP targets is a great challenge especially now that the subsidy on STW installation has been stopped and that on alternative means of irrigation developed continued[23]. Other challenges include addressing the major constraints mentioned above.

4.2 Priority Input: Fertilizer

4.2.1 Implementation status of APP fertilizer policy

Fertilizers were first introduced in Nepal in the early 1950s. In the initial years, Nepal used to receive about 100 mt of fertilizer from India from its newly established ammonium sulfate plant in Sindri Bihar. This was followed by imports of ammonium sulfate by the National Trading Limited (NTL) from Russia in the mid-1960s. Until then, usage levels of chemical fertilizers in Nepal have been quite low. Consumption started to pick up when systematic efforts to import and distribute fertilizers were launched with the establishment of the AIC under the Ministry of Agriculture (MOA) in 1966. Since then the

[21] This proportion is around 63 per cent of the targeted area in the *Terai.*

[22] For elaborate discussion, reference is made to JMA/APROSC: Nepal Agricultural Perspective Plan-Implementation Status and Future Actions: Irrigation Sector, IAU/NPC, 1998.

[23] Surface irrigation in the country is generally heavily subsidized. This makes surface irrigation more attractive to farmers than either STWs or DTWs.

consumption of fertilizers has been growing rapidly. The statistics on the consumption of fertilizers in Nepal since 1965/66 are presented in Appendix Tables 15. Figures presented show that fertilizer consumption, estimated at about 451 mt of nutrients in 1965/66, increased to 20 694 mt in 1979/80, 72 715 mt in 1990/91 and about 64 160 mt in 1996/97, which is the base of APP implementation.

Annual growth rates in fertilizer consumption between different time periods have been estimated based on these numbers and the resulting figures presented in Table 4.4. The data show that fertilizer consumption in the country grew by about 23.2 percent annually between 1965/66 and 1989/90. Consumption subsequently declined at an annual rate of about 0.7 percent between 1990/91 and 1996/97 mainly due to limited subsidy funds of the government. This led to the deregulation of fertilizer trade beginning 1997[24]. Another interesting feature of fertilizer consumption in the country is that it is generally not balanced. Between 1990/91 and 1996/97, 0.38 kg of phosphorus and 0.03 kg of potash were used for every kg of nitrogen as against the recommended proportion of 1:0.54:0.34 of the respective nutrients.

Table 4.4: Annual growth rates in fertilizer nutrient consumption in Nepal

(in percent)

Periods	Nitrogen	Phosphorus	Potash	Total
1965-90	23.00	23.83	22.63	23.19
1990-97	-1.83	2.04	2.91	-0.68
1997- 2001	1.89	8.99	-61.75	3.58

Source: Computed from Tamrakar, 1998 and Fertilizer Unit, MOAC, 2002.

The APP and the Ninth Plan have strongly emphasized policy reform in the fertilizer sector to attain the advocated high growth of the agriculture sector. Envisaged policy reforms relate to liberalization of fertilizer trade in the country. Such a policy change entails placing the private sector on equal footing with the AIC, removing subsidies[25], deregulating fertilizer prices and legalizing institutional arrangements to ensure fertilizer quality in the deregulated market.

Beginning November 1997, fertilizer became a "free entity" that can be imported directly by the private sector without consulting government, except for urea, which remained under subsidy (i.e. private importers first had to get confirmation from the Subsidy Allocation Committee [SAC] to buy the product). The government removed financial support of fertilizers beginning July 1997 except in the case of urea, whose price subsidy was removed in four phases, the last taking effect only in November 1999. Since then, however, all fertilizers have effectively been freely importable. Additionally, the AIC and

[24] Components of fertilizer deregulation involve treating fertilizers as a "free entity" (i.e. a good that can be imported by any agency), placing both public and the private sector on equal footing in fertilizer importation and distribution, removing subsidies on fertilizers, making fertilizers an essential commodity protected by the Essential Commodity Act, price regulation, allowing a transport subsidy on fertilizers sold to remote areas and defining the role of the government.

[25] The policy requires the government's complete removal of the fertilizer subsidy in the first three years of APP implementation (reduction of 33 per cent subsidy in each of the first three years) and appropriation of the full subsidy amount to meet the APP stipulated fertilizer requirement.

private sector companies are now being given equal treatment in the importation and distribution of fertilizers.

While decontrolling sales prices of fertilizers, the government has granted fertilizer importers the flexibility to fix rates based on their cost of imports and local transportation cost (except in the case of the remote 23 districts where a transportation subsidy is still maintained and also for urea until such time that its subsidy is removed completely). All fertilizer importers by now have a free hand in setting the sales price of chemical fertilizers in the 52 districts on a competitive basis.

Required legislative measures and institutional arrangements have already been put in place and made effective to ensure the quality of fertilizers imported. Fertilizers are covered by the Essential Commodity Act of 1961 and the Fertilizer (Control) Order of 1999. The SAC has been created in the Nepal Rastra Bank and a fertilizer unit within the MOA to properly promote and monitor the progress of fertilizer deregulation policy. Reference is made to Appendix Table 16 for a chronology of decisions made by HMG/N that relate to fertilizer trade deregulation.

4.2.2 Implementation status of fertilizer programmes

The APP and the Ninth Plan have emphasized balanced, extensive and increased use of chemical fertilizers to increase crop production in the country[26]. The plan has set a target of increasing the supply of chemical fertilizers in the country from 64 000 metric tons of nutrients in 1996/97 to 178 000 metric tons in 2001/2002 (Table 3.14). The targeted supply is expected is to be achieved with the participation of the private sector in the import and sales of chemical fertilizers. The role of the government in fertilizer trade is set to be gradually reduced over time.

Fertilizer supply estimates in the pre- and post-APP period are presented in Table 4.5. The figures reveal that fertilizer supply fell below target by almost 21 per cent in the first year of APP implementation, by about 36 per cent in the second year, by 46 percent in the third year and by 58 percent in the fourth year.

[26] For this the plan has prioritized fertilizer use in the following areas:

- Increased crop yield through judicious use of chemical fertilizers in the irrigated areas. Particular attention will be paid to balanced use of chemical fertilizers to minimize the negative impacts on soil properties.
- Collection of farmers' demands for fertilizers on a seasonal basis and dissemination of information to importers to ensure regular supply.
- Collection, analysis and dissemination of information on utilization patterns, quality and impacts of fertilizers on crop production.

Table 4.5: Supply targets and achievements for chemical fertilizers

(000 mt nutrients)

	Target	Achievement
1996/97	64	64
1997/98	70	55
1998/99	120	77
1999/2000	140	75
2000/01	175	74

Source: The Ninth Plan 1997-2002, NPC, HMG/N 1998.

Although supply fell short of the aim in the first four years of APP implementation, there had been a gradual improvement in the supply during the post deregulation period, indicating some positive impacts of private sector participation in the fertilizer trade. However, the decline in supply in the third and fourth years of APP implementation, which also coincided with the complete withdrawal of subsidy on urea, cast doubts on the feasibility of APP targets. Meeting APP fertilizer targets thus requires building private sector confidence in government policy, which is most likely after government's announcement of fertilizer policy in 2002.

Information presented in Appendix Table 16 indicate that importation of fertilizer since the mid-1990s was highest in 1998 and that fertilizer supply by the private sector showed an increasing trend since 1997 with a corresponding decrease from the AIC. In fact, the amount imported by the government had already began to decline in 1996/97. In 1997/98, the total amount supplied had still been lower than in the previous year even with the involvement of the private sector. In 1998, however, there was a big jump in the amount handled by the private sector (68 480 mt), with the increase equivalent to a staggering 390 percent growth over the previous year. As a result, there was a net annual increase in supply for the first time in a four-year period. In 1999, fertilizer imports by the private sector further increased to about 76 730 mt. Imports by the private sector continued increasing in 2000 and 2001 even after withdrawal of subsidies in urea.

4.2.3 Government investment in fertilizer

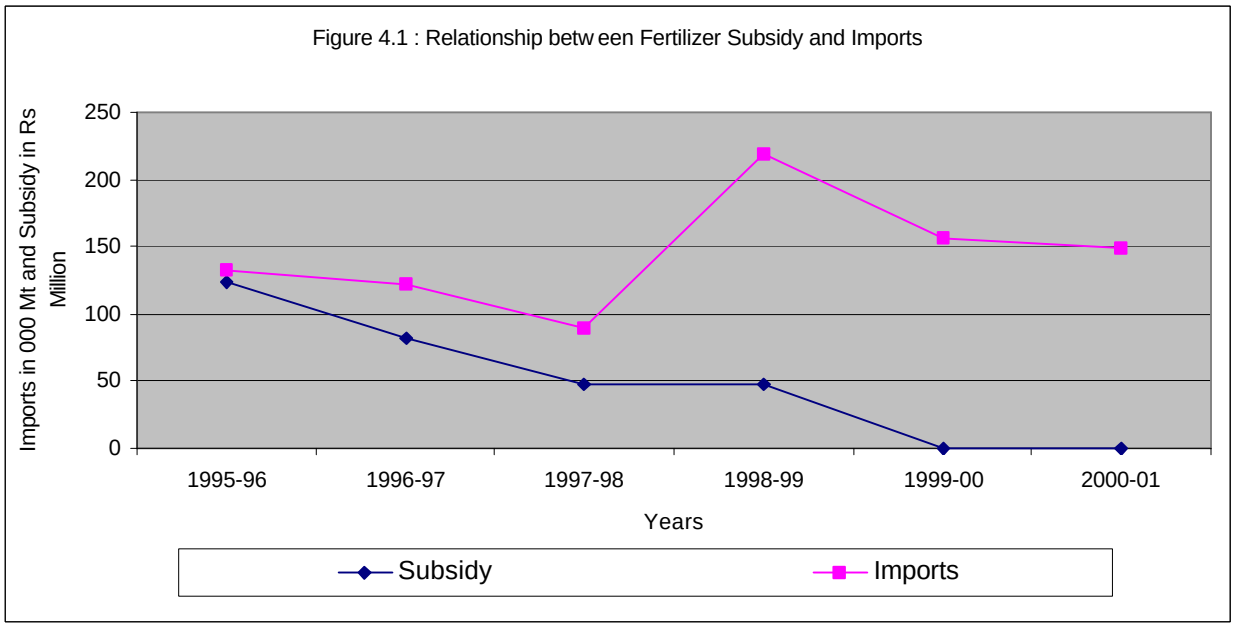
Prior to APP implementation, government had been spending huge amounts on fertilizers in the form of price and transport subsidies on all types of fertilizers. Table 4.6 below presents the trends in price subsidies provided to different kinds of fertilizers, the annual subsidy amount allocated and annual fertilizer imports before and after APP implementation.

Table 4.6: Subsidies and fertilizer imports

Year	Price subsidy (Rs/mt)			Subsidy (Rs million)	Imports (000 mt)
	Urea	DAP	MOP		
1995-96	10 719	5 960	2 977	122.9	133.0
1996-97	8 924	335	3 604	82.2	122.0
1997-98	8 015	3 472	4 470	47.3	108.7
1998-99	2 728	0	0	47.3	219.0
1999-00	0	0	0	0	155.8
2000-01	0	0	0	0	148.6

Source: Extracted from Dr. B. B. Bansyat 1999 and Fertilizer Unit, MOAC, 2002.

Subsidies on fertilizers have in general declined over time, reaching low of Rs 2 728 per mt in 1998 for urea and zero in 1997/98 for di-ammonium phosphate (DAP) and murate of potash (MOP). With the decline in the subsidy rate, the annual amount allocated to fertilizer subsidy has also declined gradually from about Rs 123 million in 1995 and 1996 to about Rs 47 million in 1999. Figures in the table also show a positive correlation between fertilizer imports and the annual subsidy allocated. However, after APP implementation, the trend seems to have been more or less reversed. This is clear from Figure 4.1. The annual subsidy amount allocated to fertilizer subsidy declined sharply in 1997 with the complete withdrawal of subsidies on DAP and MOP and a 33 per cent reduction in urea subsidy. Fertilizer imports remained almost constant from 1997 to 1998, increasing in 1998 with further reductions in subsidy on urea (i.e. by another 33 per cent). If this trend continues in the future, fertilizer imports may surge to the level anticipated by the APP (Appendix Table 16).



4.2.4 Implementation status of institutional reforms

Under the institutional reform programme covering the fertilizer sector, the APP has envisaged two major reforms covering the institutional aspects of fertilizer procurement and supply.

First, it has suggested establishing committees within the MOA involving the AIC and the private sector to facilitate coordinated growth of fertilizer supply by formulating annual/seasonal fertilizer supply plans, monitor domestic and world markets of fertilizers and develop a long-term strategy and action plan for fertilizer sector development in Nepal. A fertilizer unit has already been set up in the MOA and steps have been taken to involve the private sector in fertilizer trade. The unit has been functioning well in terms of the formulation and implementation of fertilizer trade deregulation policies in the country. Second, the plan has proposed to redefine the roles and responsibilities of the AIC under the new setting as well as to identify means and ways to help the institution operate and attain sound financial footing. The government has already split the AIC's functions by creating two separate autonomous trading companies, one dealing with fertilizer and the other dealing with seeds. Chronology of reform decisions can be found in Appendix Table 17.

4.2.5 Major problems and challenges

Government's efforts towards liberalization of fertilizer trade have moved ahead for almost four years. Private sector firms are now allowed to import fertilizers from the world market. Subsidies on all kinds of fertilizers have been removed completely and prices are now determined by the market while government intervention in fertilizer trade has been discontinued. The National Agricultural Inputs Company and the National Seed Company, which were created after the reform of AIC, have begun functioning and these are being treated just like any private entity in the business.

With liberalized trade in fertilizers, the importation and distribution of fertilizer has thus improved. However, owing to the fact that the liberalization process has gone for less than four years, several problems have already surfaced in the fertilizer sector. Three major problems confront the fertilizer sector at present. First, despite the fact that the government has shown its commitment both in policy and action towards full liberalization of fertilizer trade in the past five years, the private sector still lacks full confidence on the government. This has been the result of government's direct actions that contradicted policy in the past (e.g. the case of DAP in 1993) and indirect influence in distorting fertilizer market even after November 1997. Second, there has been an unauthorized flow of low quality fertilizer from across the Indian border,[27] a problem that surfaced more visibly after 1997. The third problem deals with the transport subsidy provided by government in relation to the supply of fertilizers in remote areas in the hills and the mountain districts. Management of such subsidies is difficult and unless adequate care is taken, these might only distort market even if the attempt is made to ensure proper distribution of fertilizers in remote areas.

[27] Laboratory analysis of fertilizers imported by the private sector from different sources have indicated that the urea imported from India have low but not spurious nitrogen content while all Indian origin DAP samples were spurious and substandard (Basnyat, 1999).

Fertilizer is the priority input of the APP and is instrumental in realizing the targeted growth rate in the agriculture sector.[28] To realize the plan's objectives, the major challenge lies in developing the private sector's full confidence in the government, which requires the latter's full commitment in sprit and action to fertilizer trade liberalization, constant monitoring of fertilizer imports to assure quality and fairness in the allocation of the transport subsidy to remote areas.

4.3 Priority Input: Agriculture Credit

4.3.1 Implementation status of agricultural credit policy

Although agricultural credit is not a direct priority of the APP and the Ninth Plan, it is an essential and complementary input that has direct implications on the successful achievement of targets set for other prioritized input and output sectors. Major policies envisaged under the Ninth Plan to expand institutional credit flow to the agriculture sector include the followings: prioritizing credit delivery to APP input and output priorities; broadening the institutional credit supply sources by encouraging NGOs and community-based organizations (CBOs) to participate in rural financial resource mobilization through saving credit schemes; mobilizing rural savings through agricultural development banks by expanding banking operations in rural areas, and targeting credits to the poor and disadvantaged sections in rural areas via targeted credit programmes. Another important policy element is the promotion of competition in the financial markets by allowing the banks to fix interest rates both on lending and deposits while remaining within the allowable limits on interest spreads.

The ADB/N and other commercial banks are already moving ahead with the concept of packaging credit with other inputs (e.g. irrigation, fertilizer and technology) in PPP areas. Directives by the ADB/N have been issued to start rural saving mobilization through a compulsory saving scheme wherein each borrower is required to deposit 5 per cent of the total sanctioned loan as credit security fund and to open new branches in rural areas to provide banking services and mobilize internal resources. The bank has also taken up the policy of converting the Small Farmer Development Programme (SFDP) into the Small Farmers Cooperative Limited (SFCL), which is entitled to undertake banking operations. Also, financial institutions are now free to fix interest rates both on deposits and lending. The ADB/N has also initiated three new branches in rural areas for savings mobilization.

4.3.2 Flow of agricultural credit

Loans disbursed by the ADB/N to APP priority sectors and other sectors during the pre- and post-APP periods are furnished in Table 4.7. In the first four years of APP implementation, credit disbursed by ADB/N to the agricultural sector per year amounted to Rs 6 241 million compared to Rs 3 784 million in the last two years of pre-APP period. This implies an almost 65 per cent increase in the amount of credit disbursed in the later period compared to the former. In the pre-APP period, sectors prioritized by APP and the Ninth Plan accounted for almost 83.1 per cent of average credit disbursed per year, while in the

[28] Targeted fertilizer growth during the APP period is expected to account between 33 to 44 per cent of agricultural gross domestic product (AGDP) growth.

post-APP period, this proportion increased marginally to 83.6 per cent. Although, the proportion of credit disbursed to APP priority sectors did not change significantly in the two periods, the increment in the average annual credit disbursed to APP priority sectors was almost 6 times higher than the non-APP sectors. Average agricultural credit disbursed per annum to APP sectors in the post APP period (Rs 5 219.7 million) was almost 46 per cent higher than the level planned under the APP (Rs 3 585.6 per year).

Table 4.7: Credit disbursement performance of ADB/N, 1996/97 to 1998/99

(Rs. Million)

Purpose	Pre-APP		Post-APP				Annual growth rate %	
	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	95-96	97-2001
APP sectors	3 065.3	3 227.2	3 739.9	4 610.9	5 952.1	6 575.9	5.3	19.48
Priority inputs	1 652.6	1 670.7	1 998	2 578.8	3 450.8	3 771.2	1.1	22.57
Priority outputs	1 412.7	1 556.5	1 741.9	2 032.1	2 501.3	2 804.7	10.2	15.86
Non-APP sectors	649.3	627	690.2	951.5	1 114.7	1 330.2	-3.4	20.69
Total	**3 714.6**	**3 854.2**	**4 430.1**	**5 562.4**	**7 066.8**	**7 906.1**	**3.8**	**19.68**

Source: Computed from information provided in NISA, 2000/01, MOAC, 2002.

Two important features of ADB/N lending in the agriculture sector can be gleaned from the above table. First, annual growth in credit disbursed to APP sectors (19 percent) has been lower than in non-APP sectors (20.7 percent) indicating a possible lack of ADB/N's importance given to lending to APP sectors. Second, growth of ADB/N's lending to APP priority inputs (23 percent) far exceeded that to APP priority outputs (16 percent).

Among the priority inputs, average annual credit disbursed by ADB/N to the crops sector in the post-APP period, which goes mainly to purchase fertilizers, increased by about 78 per cent. Credit disbursed to the irrigation sector, which is used primarily for STW installation, declined by about 34 per cent in the post-APP period compared to the pre-APP period. The decline in the credit flow to the irrigation sector, chiefly traces to the withdrawal of subsidies on STWs (Appendix Table 18).

4.3.3 Implementation status of institutional reforms

Institutional reforms envisaged for agricultural credit under the APP can be broken down into three. The first involves a proposal to establish and operate the Rural Financial Market Development Fund under the Nepal Rastra Bank (NRB) that can provide funds to institutional credit outlets such as the SFDP of ADB/N, the priority sector lending programme of commercial banks as well as Grameen banks. Funds provided in this manner are to be channeled properly and adequately to APP priorities. A rural microfinance development centre under NRB has been established and is now operational with the financial assistance of AsDB.

The second proposal of the plan is the expansion of the institutional network of the ADB/N to incorporate STWs and increase the volume of credit as planned for in the APP interim plan period. To this end, the SFDP of ADB/N has initiated a group capability enhancement programme. In addition, the bank in 1998/99 handed over the management of over 101 STWs to the SFCL. Except for the funds, the government has been supporting the bank to play its extended role in APP implementation.

The reform entails providing training to the staff of banks involved in rural credit management. Besides strengthening the existing training network of the ADB/N and further expanding its network, the plan has proposed to establish training cells in commercial banks. To create uniformity among the banks involved in providing credit to agriculture in their training programmes, the plan has proposed to form a training coordination body within Development Fund Department of the NRB. The Bankers Training Centre of NRB has been providing training to bank staff while the Rastriya Banijya Bank (RRB) has set up its own training centre. Meanwhile, the ADB/N has expanded its training programme to all the five development regions of the country.

4.3.4 Major problems and challenges

Lack of funds with the lead bank (i.e. the ADB/N) has been one of the most serious constraints in financing APP priorities[29]. Although the financial performance of ADB/N has improved significantly after implementation of its 1997 reform programme (Shrestha, 2000), meeting the APP challenge requires external resources. Unless ADB/N is provided with external resources, it will not be able to disburse the volume of credit targeted by APP. Moreover, there is no lead agency at present to oversee the aspects of STW installation. The ADB/N, which had played a pioneering role in popularizing STWs, has now been relieved of its role of acting as a lead agency for STWs. So far, no other agency has come forward to fill this gap and probably no other single agency has the combined technical, managerial and financial capabilities for launching an aggressive STW programme, which is the prime focus of APP strategy for the *Terai*.

4.4 Priority Input: Agricultural Research and Extension

4.4.1 Implementation status of policies and priorities

Numbering among the constraints that impede high growth in the agricultural sector which have been identified by the APP is the failure of government to generate and disseminate improved technologies to promote efficient use of fertilizers and irrigation water and other improved pre- and post-harvest production packages. Against this background, the plan has recognized the need to reorient the agricultural research and extension strategy towards critical problem-specific priority areas by focusing efforts on those areas that lead to fast technological change to increase productivity and the production of high value commodities and thereby promote agricultural trade in the country. To this end, the plan has

[29] Credit disbursed to APP priorities (STWs) has fallen short by almost 35 per cent during the first two years of APP implementation.

recommended a shift in the research and extension policy of the country from one of scattering of resources to many areas to one of concentrating resources in a few priority areas.

The recommended policy shift in the first five years of APP implementation include reorientation of research and extension efforts towards addressing resource management, food security and commercialization concerns in the agricultural sector. Research priorities to address resource management concerns include soil fertility management, high intensity farming systems in areas served by STWs and integrated pest management. Likewise, for research that addresses food security concerns, the emphasis rests on increasing production and productivity of major food crops. Channeling of research efforts to high value commodities such as citruses, apples, vegetables, apiculture, sericulture and livestock are the main commercial concerns.

Although there has been a general consensus regarding the need to reorient the policies and priorities of agricultural research and extension towards APP priority concerns, progress of implementation has been rather slow and unsatisfactory (MOAC, April/May, 2000). The exact implementation status of policies and priorities is presented in the next section.

4.4.2 Implementation status of research and extension programmes

A. Agricultural Research[30]

Both the APP and the Ninth Plan have emphasized the need to conduct research on priority areas Thus, to make research effective, the Interim APP has explicitly specified three focus areas for research. The first deals with resource productivity, encompassing concerns such as soil fertility, high intensity farming systems revolving around modern shallow tubewells and integrated pest management. The second is oriented towards basic food crops such as rice, maize, wheat and potato while the third focuses on high value commodities, especially citruses, apples, vegetables and apiculture, sericulture and livestock products.

Table 4.8 presents the number of research projects undertaken in the first two years of APP implementation with further details provided in Appendix Table 19. In the first two years of APP implementation (1997/98 and 1998/99), the NARC approved 729 research proposals, of which 547 belonged to the priority programme area. Similarly, 687 out of 842 research proposals submitted in 1998/99 belonged to the APP priority areas. These figures indicate that 75 and 81 percent of research proposals during the first two years of post-APP period, respectively, conformed to the APP recommendations. Further details can be found in Appendix Table 19.

[30] Latest data segregating Research projects and budget allocation into APP and non-APP sectors were available only for 1998/99.

Table 4.8: Research projects in 1997 and 1998

Research area	Number of proposals	
	1997	1998
Food crop sector	162	200
High value sector	71	81
Livestock sector	107	112
Research sector	129	202
Outreach research	78	92
APP priority projects	547	687
Other projects	182	155
Total projects	729	842

Source: NARC, 2000.

B. Agricultural Extension

The APP's approach to extension is analogously focused on three specific priority programme areas. First, it prioritizes extension activities on high intensity production systems based on STWs that encompass soil fertility and water management, variety and production demonstrations on priority commodities, integrated pest management and on-farm seed production and certification services. Second, it emphasizes extension efforts directed towards high value commodities including citruses, vegetables and vegetable seed production, apples as well as sericulture, apiculture and livestock products. Third, it has proposed concentrating extension and training activities on core extension programme, farm level training, and staff training.

Extension activities dealing with high value commodities are discussed in the next chapter. In this section, the focus of analysis is on core extension and training programmes that cover high intensity production systems. For this purpose, the time series data available from the DOA has been compiled and presented in Table 4.9.

Table 4.9: Status of agriculture extension

Programme activities	Unit	Average during period		Percentage change in post- to pre-APP period
		Pre-APP	Post-APP	
Pocket area delineated*	number	Na	858	NA
Demonstration programmes	number	26 591	38 019	142.98
Mini kit distribution	number	91 787	154 649	168.49
Farmer competition	number	263	439	166.79
Group formation	number	2 464	2 945	119.52
Farmers' day/symposium	times	584	1 631	279.46
Farmer tour	times	180	514	286.35
Agriculture fair	times	41	55	136.63
Seed multiplication programme	ha	896	812	90.67
Soil testing services	number	5 095	1 472	28.89
Leader farmer training	number	3 885	3 292	84.72
JT/JTA training	number	1 029	816	79.25

* Pocket Package decision was made only on 2054 / 12/ 6.
Source: Annual Reports, MOAC.

Information in the table refers to average annual statistics in the pre- and post-APP period. Information presented in the table shows that the largest change occurred in farmers' tour activities (286 percent) followed respectively by farmers' days and symposia (279 percent), mini kit distribution (169 percent), demonstrations (143 percent), agricultural fairs (137 percent), farmers' group formations (120 percent), seed multiplication (91 percent), leadership training (85 percent), technical training (79 percent) and extension of soil testing services (29 percent). Between 1997/98 and 2000/01, an average of 858 pockets were delineated per year, which implied that by 2000/01, a total of 2 575 pockets were delineated. The pocket area programme started only from 1997/97. From the table, one can see that there had been more intense core extension activities in the post-APP period compared to the pre-APP period. Further details can be found in Appendix Table 20.

4.4.3 Public sector investment in research and extension programmes

The development budget allocated to agricultural research in the first two years of APP implementation is presented in Table 4.10. Figures in the table indicate that in 1997/98, the budget allocated to agriculture research increased by about 21.5 per cent in 1998 compared to 1997. The APP priority research sector budget increased by 21.7 per cent in 1998 compared to 1997 showing no significant shift in research budget allocated to APP priorities.

Table 4.10: Research project budgets, 1997 and 1998

Research area	Budget (Rs 000)	
	1997	1998
Food crop sector	12 874	14 024
High value sector	4 820	6 949
Livestock sector	20 773	22 613
Research sector	9 375	13 960
Outreach research	5 903	7 871
APP priority projects	53 745	65 417
Other projects	19 813	23 992
Total projects	73 558	89 409

Source: NARC, 2000.

Among the different sectors, the livestock sector turned out to be the major recipient of resources allocated for research. The amount allocated to this sector (Rs 20.7 million) represented a 28.2 percent share of the total. Research on food crops received Rs 12.8 million, which amounted to 17.5 percent of the total budget. Outreach received Rs 5.9 million (12.7 percent) of the total budget while the high value crops sector received Rs 4.8 million (6.5 percent). The distribution of resources among the various sectors remained more or less the same in 1998/99.

4.4.4 Implementation status of institutional reforms

The APP envisages three main institutional reforms under the research and extension programme in the interim period. First, it envisions the establishment and operation of a Regional Technical Working Group (RTWG) with participation by the NARC, DOA, Regional Agricultural Directorate (RAD) and Regional Agricultural Research Stations (RARS) at the regional level. This has already been formed in the four regions, with the far western region covered by the MWDR. Second, the plan similarly suggests the creation of a District Technical Working Group (DTWG) participated in by the NARC, DOA, District Agriculture Development Office (DADO) and representatives from various line agencies (governmental and non-governmental) concerned with priority inputs and outputs. So far, such groups have not yet been formed. Third, the APP in the interim has proposed the establishment and operation of a national level High Value Commodities Promotion Board under the chairmanship of the Secretary of the MOAC and representation with organizations and agencies (governmental and non-governmental) that deal with priority inputs and outputs. Such a board has not yet been set up.

4.4.5 Major problems and challenges

The existing system of classifying research programmes under the NARC makes it difficult to match research topics with APP priorities. Research projects are usually classified based on commodities and disciplines and not by interdisciplinary themes. The nature of the project is sometimes ambiguous and their contents too broad to relate to APP priority areas. This points to ample room for improving the

contents of research proposals to conform to the APP priorities[31]. There is a strong possibility of including research projects not related to APP priorities under a broad category simply defined as high value commodities (e.g. fishery, pigs, poultry, sheep, mushroom, spices) that are not on the APP priority list. This is a major problem of agricultural research as far as APP priorities are concerned. Matching NARC's priorities with APP priorities through a shift in existing system of research planning is a great challenge. Another problem of research is that coordinated networks of interdisciplinary team of scientists do not exist at the regional research facilities of NARC except at Lumle and Pakhribas.

The APP strategy for technology development and dissemination is to follow the PPP when directing priority inputs towards priority outputs. Although the government has adopted this strategy, it contains several flaws. First, stakeholders' participation has not been sought so far in the delineation of pocket areas. Second, the programme is not backed up by full commitments from concerned line agencies dealing with priority inputs and outputs. Third, the sizes of the pockets selected are, in many cases, very small and highly variable. Fourth, the comparative advantages due to agroclimatic conditions have not been considered when defining the programme components. Fifth, associated programmes, particularly those related to soil fertility, intensification of production systems, pest management, on-farm demonstrations and farmer's training have not been properly linked to the PPP. Redirecting efforts of the NARC and MOAC towards correcting these lacunas in the programme is another major challenge in realizing the targets of agricultural growth envisaged by the APP.

4.5 Priority Inputs: Agriculture Roads[32]

4.5.1 Implementation status of policies and priorities

Agricultural roads defined as short distance all-weather gravel roads that link potential agricultural production pockets to other major roads has been perceived as one of the main catalytic inputs required to attain high growth rates in the agriculture sector through technological change and commercialization. The plan advocates the need to alter government policies related to rural infrastructure development by prioritizing construction of agricultural roads to connect potential agriculture production pockets with major market centres. This policy shift is the direct reflection of the lack of visible impact of

[31] The classification of research projects into APP priorities and otherwise presented in Table 4.6 is simply a tentative list that is created by counting the projects related to APP priority areas and separating these. There is no system of classifying research projects as APP priority projects and general projects.

[32] Nepal had 10 724 km of road in 1995 of which only 3 533 km were black-topped, 2 662 km were graveled and 4 529 km were earthen roads (CBS, 1997). This corresponds to an overall road density of about 7 km per 100 sq km of land area in Nepal, which is considered to be low even among the other low income countries. Several remote districts, including the entire Karnali Zone, are still untouched by road networks. Regionally speaking, the FWDR and MWDR are much more deprived than the other regions in this respect. It is understandable that the development of road infrastructure has been very slow in the hill and mountain districts, obviously due to the constraints of rugged terrain and fragile environmental characteristics. Consequently, the existing road network is concentrated mostly in the *Terai* region and some urban areas of the mid-hills. Yet, it is an undisputed fact that the country cannot develop without the expansion of the road network in a regionally balanced manner. The concept of rural/agricultural road networks, thus, deserves serious consideration as an appropriate strategy for the development of Nepal.

existing roads in the rural development of the country, which is attributed to the fact that adequate network of agricultural roads have not yet been established around the existing highways and feeder roads.

In the *Terai*, easy access is needed to facilitate the drilling and maintenance of STWs, the backbone of APP irrigation strategy in this geographic region. In the hills, agricultural roads will facilitate product marketing and promote agribusiness activities associated with the high value commodities that are the foundation for income increases envisaged under the APP. For the implementation of the proposed road development plan, APP recommends setting up of a Department of Agricultural Road within the Ministry of Local Development (MLD).

To address the situation, a separate Department of Rural Infrastructure Development and Agricultural Roads (DOLIDAR) was established in 1998 under the MLD and priorities are being accorded in the Ninth Plan for the construction of agricultural roads. In compliance with APP guidelines, HMG has now set a target entailing the construction of 6 200 km of agricultural roads in the next twenty year time frame of the plan. Basically, these roads will connect prioritized pocket areas that have good potential for agricultural production.

4.5.2 Implementation status of agricultural road programmes

Agricultural roads programme in the country started in 1998 after the formal establishment of the DOLIDAR in the MLD. The Interim APP or the Ninth Plan had set a target of constructing 181 km, 446 km, 537 km and 537 km of agricultural roads in the first four years of APP implementation, respectively. Of the total road lengths targeted, the entire length (181 km) was fixed for *Terai* in the first year and correspondingly 349 km, 77 km and 20 km in the *Terai*, hills and mountains in the second year and 349 km, 151 km and 37 km in the *Terai*, hills and the mountains, respectively, in the third and fourth years (JMA/APROSC, 1997). Information presented in Table 4.11 shows that, while there had been no physical achievements in the first year owing to a lack in the required institutional set up during the first year, a total of 85 km roads comprising 49 km earthen and 36 km graveled roads were constructed during 1998/99. While these achievements fall short of the targets set, other complementary activities are underway.

Table 4.11: Targets and achievements of agricultural road construction

Work Details	Targets	1997/98	1998/99	1999/00	Total
Districts covered (no)		–	28	11	39
Survey completed (no of projects)		–	87	41	128
Construction ongoing (no of projects)		–	55	41	96
Works completed (no of projects)		–	32	-	32
Road construction, no of km (1997-99)	1 164	–	85	125	210

Source: Implementation Status of Agricultural Roads, Monitoring and Evaluation division, Ministry of Agriculture and Cooperatives, HMG, Nepal (May 2000).

Until April 2000, a total of 128 projects have been identified in 39 districts. Of the total projects identified, 32 have been completed while construction of the remaining 96 projects is ongoing. Assuming that the average length of roads under construction is 8 km[33], completion of ongoing roads will add 768 km by the end of 1999/2000. Only 73 per cent of the target is expected to be meet in the first four years of APP implementation.

4.5.3 Investments in agricultural roads

The Interim APP has projected yearly investments for agricultural roads. During the five year period, the plan has projected a total investment requirement of Rs 4 609 million for the construction of 2 238 km of agricultural roads (JMA/APROSC, 1997). Investment planned for the first four years amounts to about Rs 3 414 million.

Budget allocation to the programme, however, has fallen short of targets. In the first and the second years, only 8 to 9 per cent of the planned budget had been provided, which slightly increased to around 13 per cent in the third year and to 17 percent in the fourth year. In the first four years, only about 13 per cent of planned investments was provisioned (Table 4.12). Although this rightly corresponds to the physical achievements (18 per cent), indications are that construction costs of agricultural roads have been much lower than planned as larger portions of the roads currently under construction are expected to be completed within this fiscal year from the amount provisioned.

Table 4.12: Financial targets for agricultural roads in the Ninth Plan

Fiscal year	Investment targets (Rs million)	Budget allocated (Rs million)	Allocated budget as % of targets
1997/98	224	20	8.9
1998/99	811	70	8.6
1999/00	1 189	150	12.6
2000/01	1 190	200	16.8

Source: JMA/APROSC, 1997 and MOAC, May 2000 and Official record of DILIDAR, 2002.

4.4.5 Implementation status of institutional reforms

Under the institutional reform programme affecting rural transportation for the smooth supply of priority inputs and marketing of priority outputs, the APP has proposed establishment of the Department of Agricultural Roads (DOAR). In line with the proposal, the government has already established the DOLIAR, which is now fully functioning.

[33] Derived as the average of 87 roads either under construction or surveyed until 1998/99.

4.5.6 Major problems and challenges

The experience of the past four years has brought to the surface one major constraint in the implementation of the agricultural road programme. The newly created DOLIDAR under the MLD is responsible for implementing all works related to rural and agricultural roads in the country. Although at first glance these infrastructures appear similar in nature, there is a subtle difference between the two, which has not been fully appreciated. While rural roads can be constructed anywhere in the district upon the demand of political leaders or the local people, agricultural roads are technical roads that can be built only in areas that meet a set of well-defined criteria. This fact is not recognized in practice and the two types of roads are hence almost always treated as belonging to the same category. There is thus an urgent need to clearly define the nature of agricultural roads so that they can receive the deserved priority and urgency. Another problem in the context of the implementation of the agricultural road programme has been the lack of sufficient will and commitment for the selection of pocket areas to be connected by such roads, mainly due to various political reasons on the part of the district development committees.

4.5 Priority Inputs: Rural Electrification

To support the development of year-round irrigation in the *Terai* through DTW and STW installation and operation and promote agro-processing industries and commercialization in the potential pocket areas, the APP has prioritized rural electrification in this region as well as in the hills and mountains. The rural electrification programme has to go hand in hand with the development of tubewell irrigation and rural road construction. In the interim period, the plan has set a target of extending a total of 218 km of transmission lines in its last two years. For this purpose, it has projected investment totaling about Rs 1 308 million (JMA/APROSC< 1997). As per the midterm evaluation of the Ninth Plan, a total of 3 437 km of transmission lines were extended in the rural areas in the first three years. The extent to which these transmission lines confer with APP priorities, however, is not known[34].

[34] APP planned transmission lines relate to PPP areas but not to general rural electrification.