

# **ECONOMIC POLICY NETWORK**

**Policy Paper 30**

## **CONSTRAINTS AND APPROACH FOR IMPROVING FERTILIZER SUPPLY FOR MEETING DOMESTIC DEMAND**

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Inputs from various stakeholders during interactions at Advisory Committee meetings, and the workshop organized by the EPN Focal Unit, have been incorporated in the report.

## Foreword

Economic Policy Network (EPN) initiated in August 2004 is an undertaking of Government of Nepal (GoN) with an Asian Development Bank (ADB) Technical Assistance (TA) to develop and institutionalize an open, responsive and result oriented economic policy formulation process based on sound economic analysis and dialogues with the partnership of public and private sector, academia, and independent professionals, to support and consolidate the Government's economic policy reforms on poverty reduction strategy. The initial focus has been in the areas of macroeconomic management; trade, investment and employment; infrastructure development; and tourism, agriculture, and regional development through four thematic advisory committees chaired by the secretaries of the respective implementing ministries, and guided by a high-level steering committee. The present study is an outcome of the initiative under the Advisory Committee for Economic Policy on Tourism, Agriculture, and Regional Development chaired by the Secretary of the Ministry of Culture, Tourism, and Civil Aviation.

This report has attempted to analyze the supply of chemical fertilizers under different legal arrangements and has also reviewed its trend over the years. The recommendation includes the necessary policy reforms to be undertaken by the GoN to help improve the supply situation of chemical fertilizers. The recommendations are the outcomes of consensus reached among major stakeholders through various consultations and the EPN workshop. I hope the findings and recommendations will be helpful for policy makers for future reforms.

I would like to thank Mr. Yam B. Thapa for carrying out the study. I also thank all those who have provided inputs for the report during the interactions, the advisory committee meetings, and the EPN regional workshop held in Nepalgunj. The work of the advisory committee for Economic Policy on Tourism, Agriculture, and Regional Development is to be commended for selecting the issue and for following through with the study. I would also like to appreciate the entire EPN team for their hard work. Last but not least, I would like to thank the ADB for supporting this initiative.



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## EXECUTIVE SUMMARY

The growth of national income is highly correlated with the agriculture output. The Agricultural Perspective Plan Assumed that incremental growth of agriculture depends in the uses of the chemical fertilizer to the extent of as much as about 70 percent. Following the deregulation of the fertilizer sector in 1999, there have been concerns about the lack of increase in the supply of chemical fertilizer. So the present study was carried out for: (i) Review the trends in chemical fertilizer supplies; (ii) Assess constraints in improving the supply of chemical fertilizers, (iii) Suggest approach to solve these problems, (iv) asses the domestic demand for fertilizers, (vi) prepare a policy action matrix.

### **Fertilizer Marketing Channels**

Nepal has two sources of fertilizer supply, namely, imports from India or overseas countries. The fertilizer supply lines comprise of *official supply* and the *informal/ unrecorded supply* channels. The formal import orders from Nepal are very small volume. The suppliers transport these fertilizers to Singapore for trans-shipment to Kolkotta/ Haldia. It is further transhipped to Raxaul via train or truck for further transshipment to Birgunj (Nepal) by trucks. Birgunj supplies such fertilizer to all major border towns, terai area, and motorable hills. The inaccessible districts get transport subsidy. The fertilizers dealers get about Rs 1.75/ kg commission for selling fertiliser to farmers or agro-vets, but the agro-vets would add on their local transport, retailing and profit rate to mark-up the selling price to the farmers.

Nepal informally imports fertilizer from India across the open border as unrecorded trade. The supply costs are the Indian selling price to farmers, plus the collection costs to make bulk quantities, adulterations and informal payments to relevant agencies en-route to Nepal. The informal imports of fertilisers are estimated to be about three times more that the formal imports.

### **Liberalisation: Fertilizer Imports and Subsidy**

The fertilizer-sector liberalisation programme 1997 made quite a few significant changes in the way fertilizer supply business was handled, namely, removed price subsidy and transport subsidy, let the fertilizer prices to de determined by their demand and supply conditions, put fertilizer imports under open general licensing, removed import duties and VAT on fertilizers imports, removed excise duties on manufacture of fertilizers, provided foreign exchange facility to import fertilizers, recognised fertilizer as essential commodity, appointed fertilizers inspectors to monitor the quality and penalize the adulterations, upgraded facilities for fertilizer testing in the department of food and quality control, and so on.

Total imports of fertilizer was about 180 thousands MT during 1992-1994. But following liberalisations, the fertilizer imports are around 140 thousand MT. Overall, the total imports declined by 2,170.2 MT every year. The private traders are leading agencies in fertilizer imports. In other words, the official data on the uses of chemical fertilizers grossly under estimate the fertilizer supply.

## **Informal Trade in fertilizers**

The Agricultural Sector Performance Review found that the use of fertilizer by household was 58 kg (nutrient) per hectare for year 2000/01. This is close to the APP target level for the year. The higher uses of fertilizer at the household level have been made possible by informal trade across the Indo-Nepal border. The study suggests that that out of the total fertilizer uses of 428,373 MT, about 65.8 percent of fertilizers used are supplied through the channels of informal imports. In other words, the APP target for fertilizer uses is being closely followed. The lack of expected growth in agricultural output might be attributed to non-fertilizer issues such as lack of irrigation, infrastructures, market, prices and conflicts.

The role of informal/ unrecorded imports of fertilizers in the use of fertilizers by the households has further increases in year 2004/05. Trend analysis and opinion of traders show that fertilizer uses have increased by about 11.5 kg per hectare annually. Total fertilizers uses is about 423,887 MT for the year 2005/06 (area 3.3 million ha). The share of *informal imports of fertilizers in total supply is about 71.6%*. In view of the above mentioned significance of the informal imports of fertilizer from India, we need to encourage the farmers to import fertilizer across the border for direct uses in their farms, and work out with India to formalize it.

If Nepal reverts to subsidy for fertilizers at par with India, Rs 3.1 billions would be required annually. It might be unaffordable. But the differences in urea prices in international market, India and Nepal are such that, Nepal will always face a market failure unless it harmonizes with Indian agricultural policy. The fertilizer prices in Nepal are some 39 for DAP to 101 for percent for higher than India. Since, the size of fertilizer market in Nepal is around one percent of India; Nepal can not sustain such higher prices. Fertilizer is restricted commodity for exports by India. So Nepal should request to India for a special arrangement for export of fertilizer from India to Nepal. Nepal may approach both India and Bangladesh for such a JV for fertilizer factory in the region.

## **Constraining to Fertilizers Supply**

The principal factors holding back the fertilizer supply may be listed as follows. First, Formal trade on fertilizer between India and Nepal is not allowed to take advantage of higher prices in Nepal. When Imports are made in US \$, such imports can not be sold because the traders supply subsidized fertilizer of India at lower price to Nepal. Second, the private sectors traders have limited capacity vis-à-vis public agencies for fertilizer trade and marketing activities in terms of size of equity finance, volume of bank guarantee, and infrastructures to handle fertilizer through out the year. Third, the Nepali suppliers have low volume of transactions and hence higher unit cost of marketing (relative to IFFCO/ MMTCI in India BCIC in Bangladesh), Nepal's AICL, private traders or government have lack of a system to maximize procurement lot sizes. Fourth the banks while issuing the Letter of Credit have difficulty to maintain the risk exposure ratio with respect to fertilizers traders, and there is lack of mechanism for consortium finance. Finally, the traders face difficulty due to excess handling and transport charges, transport cartels, lack of system for destination delivery, lack of wire-housing and storage facilities, and lack of transport and transit agreements with neighbouring countries.

## **Adequacy of Fertilizers Supply to Meet Demand**

The economic analysis the ministry and departments need to be upgraded such that we have sufficient information on optimum level of fertilizer applications. These include empirical estimates of (a) the production function, (b) farm gate prices for outputs, and (c) farm gate prices for fertilizers. A case study for paddy shows that the present level of fertilizer use is about 68 kg nutrient per hectare whereas the economic optimum level would be 92 kg per hectare. This translates into a total demand for fertilizer is 528 thousand MT at the most. The scenario might improve if the fertilizer use technology, or relative prices or the complementary inputs such as irrigation and infrastructures improve.

## **Policy Reforms to Improve Supply of Fertilizers**

**Immediate terms**, the following reforms in policy are needed to improve the supply of fertilizers. In the immediate terms (1-2 years), the following actions need to be taken. First, the macro decisions to supply fertilizers should be founded on the farm households' decisions on optimum amount of input uses. Second, the price of fertilizers is very high in Nepal relative to India and International market. So the traders and farmers will benefit from the import of Indian fertilizer. However, there are restrictions on it. The Government should facilitate the (informal) import of fertilizers from India by making it legal activity. Third, the AICL and co-operatives have huge unused human, logistic and even financial resources to carryout fertilizer imports and marketing. The Government should encourage it. In addition, the private traders of fertilizers should be allowed to use the go-downs/ warehouse of the AICL and cooperatives, which are under-utilized. Fourth, Government and Chambers of commerce should arrange for consortium finance of large traders for over seas imports of fertilizers. The Government and Central Bank should consider providing government guarantee for big imports of fertilizers. Fifth, the Transit Treaties allow for the transportation but it remains to be effectively used to allow for destination delivery of fertilizers from the Kolkotta/ Raxaul ports to Nepal's interior area. This is more applicable because fertilizer is an essential commodity. Sixth, Arrange for lot procurement of fertilizers in the International market by pooling the resources and businesses of the traders, AICL and Cooperative apex body, when it becomes active.

**In the medium term** (3-5) years, the following actions need to be taken. First, carryout study of fertilizer shipment through JNPT/ Mumbai to western parts Nepal, and import of fertilizers for mountain region border areas via Tibet/ China. Second, arrange for equity investment in the Bangladesh and Indian fertilizer factories. Finally, propose to make fertilizer trade a freely traded commodity in the Nepal-India Trade Treaties.

**In the long term** (5 years or more), the following actions need to be taken. First, plan for regional factories of fertilizer such as those as done in the South-East Asia. Lastly, use SAFTA to make fertilizer a freely traded commodity in South Asia and harmonise the agricultural policies of the countries in the region. At the end, the report also includes a Policy Action Matrix.

# Chapter I

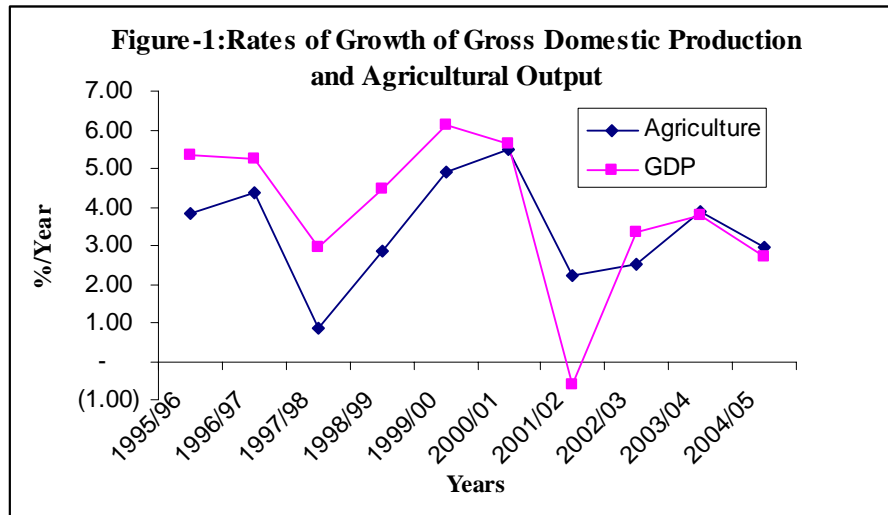
## Introduction

### 1.1 Background

The Agricultural Perspective Plan (APP) for the period 1994/95 – 2014/15 assumes a very strong relationship among the national income, agriculture growth and use of chemical fertilizers for the latter. For example, the gross domestic production (GDP) is highly correlated with the agricultural GDP as shown in Figure-1 and equation below. The equation shows that every one percent growth in the agricultural output would add to the GDP growth rate by a coefficient of 1.01. In other words, the agricultural growth rates explain about 49 percent variation in the changes in GDP in the last decade:

$$\text{GDP growth rate} = 0.49 + 1.01 \text{ Agri-output growth rate}, R^2 = 0.49, \text{ Period } 1995/96\text{-}2004/05$$

During the past decade, the agri GDP growth has remained around 3.4 %/ annum. This is much lower compared to the Agricultural Perspective Plan (APP) target to achieve the agricultural growth rate of 5 %/ annum.



On the other hand, the APP has listed the uses of chemical fertilizers as high priority input for increasing the agricultural incomes. For example, ANZEDC (2002) states that about half of agricultural growth during the 9<sup>th</sup> Plan period is attributed to increased availability of fertilizer. Similarly, the APP had accounted that uses of fertilizer would contribute about 70% of the incremental growth in crop output as follows:

<u>Sources of growth</u>	<u>Growth rates (%/yr)</u>
• Trend growth of agriculture during past decades:	3.0
• Fertilizers' contribution for additional 2% growth (2.0*0.7):	1.4
• Irrigations' contribution for additional 2% growth (2.0*0.3):	<u>0.6</u>
Total	5.0

Following the adoption of the APP, the government has progressively reduced subsidies on fertilizers and deregulated the sector since 1997/98; subsidy was completely eliminated in 1999/2000, it allowed the private sector to compete with Agricultural Input Corporation

(AIC), converted the AIC into a limited company (AICL). It was expected that such liberalization ease the supply constraints for fertilizer and bring about higher agricultural growth. The government also brought out *National Fertilizer Policy 2058 BS*, the *Essential Commodities Control (Authority) Act 2017 BS*, *Chemical Fertilizer (Control Order) 2055 BS*, and *Chemical Fertilizers Guidelines 2057 BS* to help easy supply of chemical fertilizer and to maintain good quality.

The economic growth rates have remained far below the expectations. The GDP growth rate was 3.90 %/year, whereas the agricultural growth rate was lowest at 3.38 annually in the past decade. Also, the agriculture in the hills and mountain regions has grown at a much slower pace.

Nepal's neighbours, namely India, Bangladesh or China have increased agricultural growth through, among others, more application of chemical fertilizers per unit area of cultivated land. Table-1 below shows that Nepal is had applied chemical fertilizers at the rates of 28 kg nutrient per hectare (based on official supplies) and has the lowest agricultural growth rates. The data also show that agricultural growth rates increase with level of fertilizer uses kg/ ha.

**Table 1: Fertilizer Use Rates and its Growth in Nepal and Neighbouring Countries**

Particulars	Nepal	India	B'desh	China
Agri-growth (%/yr) 1990-2001	2.6	3.0	3.1	4.0
Fertiliser (kg/ha) in year 2002	27.8	99.6	177.5	277.7
Increase in fertilizer uses (kg/ha/yr) 1974-2002	1.1	3.5	6.0	7.8
R <sup>2</sup> of the trend	0.74	0.98	0.98	0.88

Source: Based on data from World Development Indicators 2005, CD ROME

The APP aimed to increase the uses of fertilizers from 25 to 131 kg nutrients per hectare in the country during 1994/95 – 2014/15 (Ref Table 2). The targets are set separately for the mountain, hills and terai regions. The highest emphasis was given on food production in the terai region with target for chemical fertilizer application as 152 kg per hectare.

**Table 2- APP Target for Chemical Fertilizers Uses**

Year	Mountains	Hills	Terai	National Average
1994/95	10	18	31	25
1999/00	14	30	53	42
2004/05	19	49	79	64
2009/10	28	75	112	94
2014/15	38	109	152	131
% increase over 1994	280.0	505.6	390.3	424.0

Source: APP Document, 1995.

## 1.2 Issues and Scope of the Study

In the above context of low and disproportionate growth of agricultural sector in Nepal, the terms of references (TOT) for the study sought to answer the following questions:

- 1) Review the trends in chemical fertilizer supplies.
- 2) Assess why Nepal has not been successful in improving the supply of chemical fertilizers for meeting the domestic demand.
- 3) The deregulation policy adopted by the government encouraged private sector to participate in fertilizer business. However, the supply situation of chemical fertilizers did not improve even after the participation of private sector (including the Agricultural

- Inputs Company Ltd). Analyze the major factors causing this import situation of chemical fertilizers.
- 4) Suggested policy reforms to improve the supply of chemical fertilizers.
  - 5) Suggest a policy-action matrix containing (a) constraints (policy, legal, institutional, administrative, and others if applicable); (b) recommended policy improvements; (c) activities; (d) indicators of achievement; (e) responsible agencies; and (f) timeframe (immediate, intermediate, and long-term)

The study was conducted over a period of one month.

### **1.3 Methods, Sources of Data and Limitations**

The report is organised in line with the tasks mentioned in the TOR. The study has emphasized analysis of chemical fertilizer supply assuming that domestic demand for it would be there. But a more proper assessment of demand for fertilizers and market clearances are needed to support the arguments for the supply side, which is what is done below. The report is organised in line with the tasks mentioned in the TOR.

The study employs trend analysis, correlation analysis, and comparison of ratios. It tries to assess the fertilizer demand at the aggregate level and farm household levels, options for fertilizer supply. The conclusions and recommendations are based on the analysis of the above data. The policy action matrix is based on the stakeholders' present capacity, interest, investment requirements and their attitudes towards fertilizer supply business.

The data for conducting the study are based on secondary sources and researchers inquiries with experts and traders. The data on the sources of fertilizer imports/ supplies are based on the discussion on the traders and government officials. The comparison of the fertilizer uses per hectare are based World Development Indicators. Similarly, the data on fertilizer supply, pricing and uses in India are based on The Fertilizer Association of India (December 2004) *Fertilizer Statistics 2003-04*, and the Government of India *Economic Survey 2004-05* and *Economic survey 2005-06*. The data on quantity of fertilizer imports and their sources are based on MOAC Fertilizer Unit, which were cross-verified through meeting with the importers. We also refer to prior studies on fertilizer uses, namely, ANZEDC (January 2002) *Nepal Agricultural Sector Performance Review*, Peter Gruhan at el (July 2003) *Nepal Fertilizer Use Study*, the IDL group (July 2005) *Agricultural Perspective Plan Implementation Action Plan Preparation*. The statistics on fertilizer application rates by crops are based on the Central Bureau of Statistics (? 2004) *National Agricultural Sample Census 2001/02*. The data on farm gate prices of paddy and fertilizer application rates on it are based Department of Agriculture (2062 BS) *Cost of Production and Marketing Margin per hectare of Some Important Cereal Crops, Nepal (2061/062 (2004/05))*. The data on prices of fertilizers by its types and complaints on quality in the districts are based on the reporting of the District Agricultural Development Offices to the Ministry of Agriculture. The assessment of the profile of traders is based on the analysis of the Letters of Credit (LC) issued by the banks for fertilizer imports. The LC also provides information on fertilizer prices during various stages of imports. The data on international prices of fertilizer are based FADINAP and FAO websites. Local news paper reports are also considered.

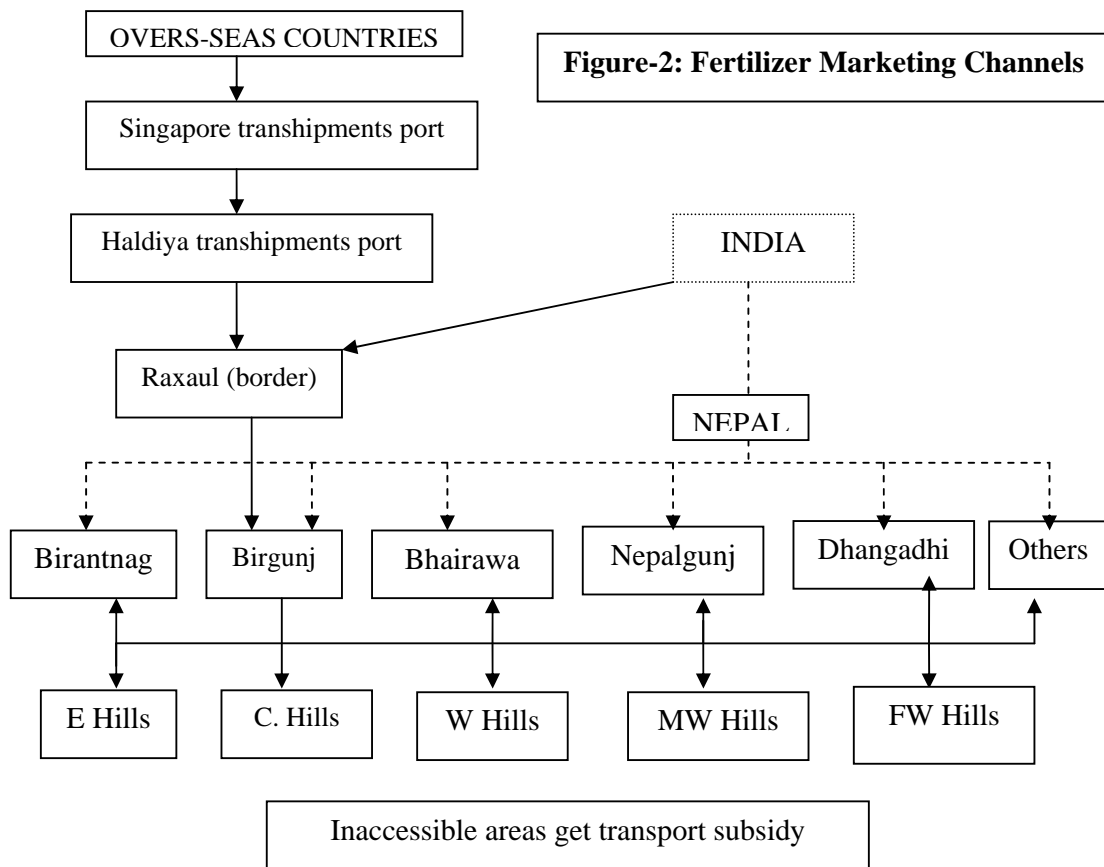
The present study has left out much to be done on the reassessment of the sources of the agricultural growth in the present context, a detailed discourse on the chemical fertilizer manufacturing plant in Nepal, and a evaluation of non-mineral fertilizers and other inputs because these are outside the scope of the present study and time.

## Chapter II

### Review of Trends in Chemical Fertilizer Supply

#### 2.1 Sources of Imports: Formal and Unrecorded

Nepal has two sources of fertilizer supply, namely, the formal imports or informal imports. This is summarised in Figure -2 below. The official supply lines are represented by a continuous line whereas broken lines represent the informal imports. Officially, the fertilizer imports originate mostly in the market such as the Gulf, China, USA, Eastern Europe and Bangladesh. Since the orders from Nepal are very small volume, the suppliers carry the fertilizers to Singapore (deep sea port) for transshipment to Haldia (shallow water vessels). From Halida/ Kolkotta, it is transhipped to Raxaul (India) via train or truck for transshipment to Birgunj (Nepal) by trucks. Birgunj supplies such fertilizer to major border towns, terai area, and motorable hills. Inaccessible districts get transport subsidy. The local dealers get commissions of about Rs 1.75/ kg for selling fertiliser to farmers or agro-vets, but the agro-vets would add-on their local transport, retailing and profit margins to mark-up the selling price to the farmers.



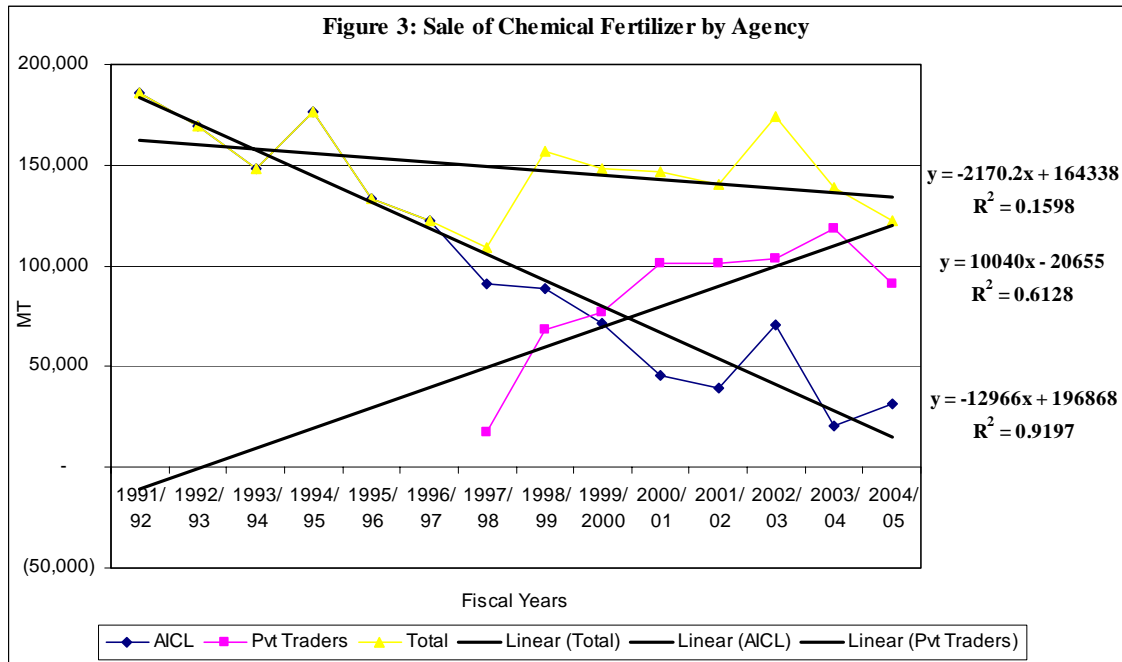
In case of informal imports of fertilizer from India, the traders or depots directly sell fertilizer across the open-border to Nepal as unrecorded trade. The supply costs are the Indian selling price to farmers, plus the Indian traders' collection costs to make bulk quantities, adulterations and informal payments to relevant agencies en-route to Nepal. Ironically, Nepalese customs and police restrict such imports, some factories "produce" mixed fertilizers from such sources, some traders engage in adulterations of

such fertilisers, or some importers mix the overseas-imports with informal-Indian imports. In any case, it has helped in the supply of fertilizer to the farmers where there is not much problem with quantity or time but frequent reports are heard about quality of fertilizers.

## 2.2 Trends in Formal Imports of Fertilizer Imports, and Total Supplies

The fertilizer-sector liberalisation programme made quite a few significant changes in the way fertilizer supply business was handled since 1997. These include: removed price subsidy on the fertilisers, removed transport subsidy on fertilizers, let the fertilizer prices to be determined by their demand and supply conditions, put fertilizer imports under open general licensing (OGL), removed import duties and VAT on fertilizers imports, removed excise duties on manufacture of fertilizers, provided foreign exchange facility to import fertilizers, issued the fertilizer policy and the fertilizer control orders to make fertilizer as essential commodity, appointed fertilizers inspectors to monitor the quality and penalize the adulterations, upgraded facilities for fertilizer testing in the department of food and quality control, and so on. Since the above institutional reforms, there have appeared some 15 importers of fertilizers and three manufacturers of fertilizers.

The imports of fertilizers by AICL and private traders before and after the trade liberalisations are presented in Figure 3 and Table 3 below. The total imports of fertilizer was in the range of 180 thousands MT during 1992-1994. But following liberalisations, the fertilizer imports are around 123 thousand MT by year 2004/05. Thus, the total imports declined by 2,170.2 MT every year. This is because the AICL imports have declining by 13 thousand MT annually but the private traders imports increased by 10 thousands MT every year during this period. In year 2004/05, the AICL imports dipped to 32 thousand MT, and the private traders imports too declined to 91 thousand MT. The private traders have emerged as leading agencies in fertilizer imports.



**Table -3 Sale of Chemical Fertilizers by Agencies (MT)**

Fiscal Years	AICL	Pvt Traders	Total
1991/ 92	185,797		185,797
1992/ 93	169,767		169,767
1993/ 94	148,413		148,413
1994/ 95	176,688		176,688
1995/ 96	133,250		133,250
1996/ 97	122,223		122,223
1997/ 98	91,178	17,550	108,728
1998/ 99	88,350	68,477	156,827
1999/ 2000	71,460	76,727	148,187
2000/ 01	45,220	101,145	146,365
2001/ 02	39,358	101,408	140,766
2002/ 03	70,746	103,636	174,382
2003/ 04	20,493	118,265	138,758
2004/ 05	31,811	90,895	122,706

Source: Based on MOAC (Dec. 2005) Statistical Information on Nepalese Agriculture 2004/05

The data on the formal supply of chemical fertilizers during 1994/95 -2004/05 show that the fertilizer application rates had reached 26 kg nutrient / hectare by 1998/99 (Ref Table 4). After liberalization of fertilizer trade, the use of the fertilizers supplied by the traders and AICL declined to 19.7 kg per hectare by year 2004/05. This is a decline of (-) 4.2 percent annually. Among the NPK, the nitrogenous fertilizer uses has declined (-6.68%/ year), whereas the phosphorous and potassium fertilizers are positive.

Considerations of informal imports are necessary for a complete picture of fertilizer supply. For example, ANZEDC (2002) noted that the field surveys data suggest that, contrary to the perception of the official figures, the fertilizer situation is not only in line with the targets of the 9<sup>th</sup> Plan, but in fact over-shooting the target. While the target for total nutrient consumption in Nepal in the year 2001/02 was 178,058 mt, the estimated consumption in the year 1999/2000 was 209,976 mt. The next section deals with it.

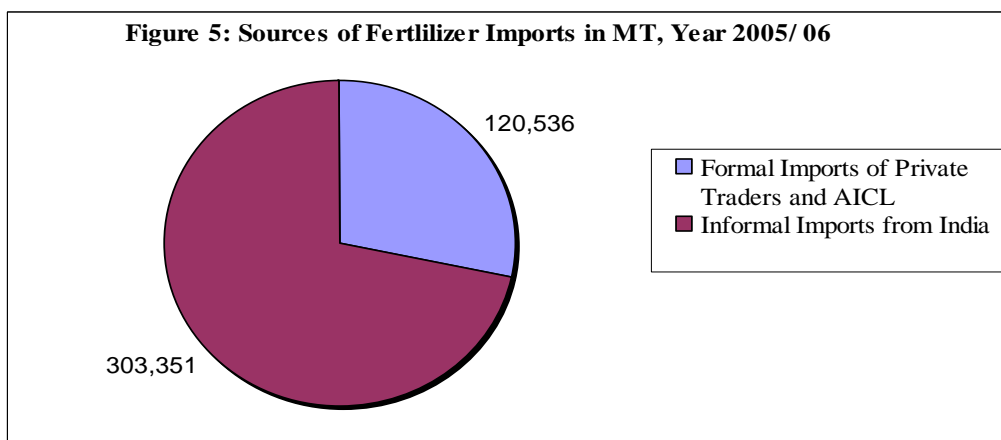
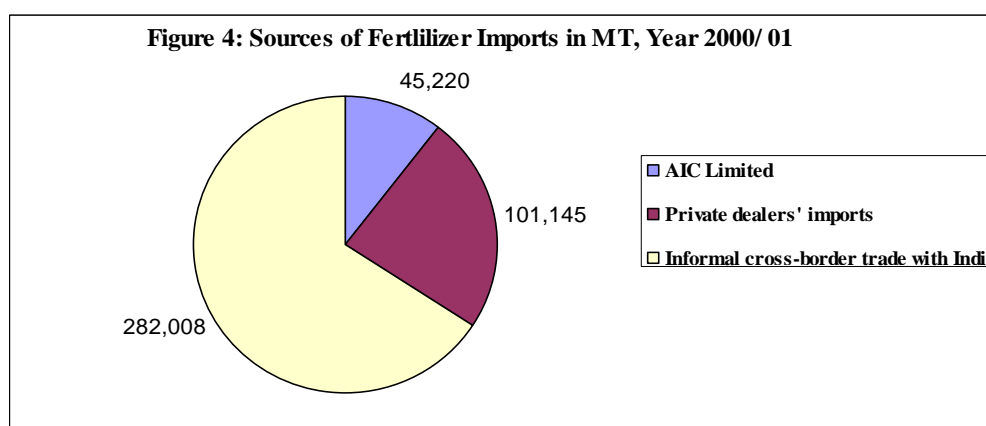
**Table 4: Supplies of Chemical Fertilizers by AICL in Nutrients Terms**

Year	Nitrogen (N)	Phosphorus (P)	Potash (K)	Total (NPK)	NPK(kg/ha)
1994/95	64,385	24,300	1,578	90,263	30.4
1997/98	40,399	13,124	2,123	55,646	18.8
1998/99	63,813	12,097	1,258	77,168	26.0
1999/00	55,836	18,900	185	74,921	25.2
2000/01	54,453	20,526	20	74,999	25.3
2001/02	47,005	24,512	809	72,326	24.4
2002/03	59,484	27,321	2,202	89,007	30.0
2003/04	51,620	24,721	1,581	77,922	26.3
2004/05	36,493	22,360	1,871	60,723	19.7
Gr (1994-2004) %/yr	-3.03	5.93	4.07	-0.54	-0.81
Gr (2000-2004) %/yr	-6.82	1.81	165.04	-3.42	-4.20
N:P:K (%) (2002-04)	64.8	32.7	2.5	100.0	

Notes: NPK ratios refer for average of years 2002/03-04/05. Source: MOAC Fertilizer Unit.

#### 1.4 Informal Imports of Indian Fertilizers, Liability and Scope of Manufacturing

ANZEDC (2002) estimated that the household had applied fertilizer at 58 kg per hectare in the year 2000/01. This is close to the APP target level for the year. The higher uses of fertilizer at the household level have been made possible by informal trade across the Indo-Nepal border (Ref Figure 4 and 5 and table 5). The figure suggests that that out of the total fertilizer uses of 428 thousand MT (gross), about 65.8 percent of fertilizers are supplied through the channels of informal imports.<sup>1</sup> Similarly, the ANZEDC reported that in year 1999/2000, the share of informal supplies on actual progress was as follows: N 51.4%, P 78.8%, K 84.9%, and total nutrient 63.8%. In other words, the APP target for fertilizer uses is being closely followed. So the less than expected growth in the agricultural output might be attributed to non-fertilizer issues such as lack of irrigation, infrastructures, market, prices and conflicts.



<sup>1</sup> ANZDEC (2002) Table Annex b6.17b also report imports from India as percent of total use to be 66% in year 2000/01, which is a significant increase from such share at 55% in year 1997/98.

**Table-4: Fertilizer Application Rate in year 2000/01**

Sr No	Sources	Total MT	% share	Kg/Ha (npk)
1	AICL	45,220	10.5	7.6
2	Private dealers	101,145	23.6	17.0
3	Cross-border trade	282,008	65.8	47.1
	Total	428,373	99.9	71.9

Sources: ANZDEC (2002) AnnexB6.17a for imports from India, and above table 2 (based on MOAC) for imports by AICL and registered import-traders.

We assume that here that ANZDEC's estimate of 282,008 MT as import from India refers to the informal imports only, i.e. there is no double count between the official imports and the informal imports of fertilizers from India in that year, and that the nutrient ratio is 52%. The role of informal imports of fertilizers has increased in recent years 2004/05. Using data from the ASPR field studies, a linear trend for 1997/98–2000/01 shows that the fertilizer uses have increased by about 11.5 kg per hectare annually to 71.1 kg (linear trend). Its projection imply that the fertilizer uses are about 125.2 kg per ha for the year 2004/05, and 136.7 kg per ha for year 2005/06. This translates into fertilizers uses in total to be as 423,887 MT for the year 2005/06<sup>2</sup>. Informal imports of fertilizers from India can be estimated as total uses by households less formal imports for year 2005/06 as follows.

a) Total uses of fertilizers by households in year 2005/06:	423,887 MT
b) Formal imports of fertilities by AICL and traders in 2005/06:	120.536 MT
<i>Informal imports of fertilizers from India = (a)-(b)</i> :	<i>303,351 MT</i>

The data in Table 5, last column imply that the average growth rate in fertilizer supply is about 10.86 percent annually.

**Table 5: Fertilizer uses by households (Kg/ Ha)**

Years	Official imports	Informal Imports	Total Uses	Predicted total uses
1,997 /98	17.8	25.2	43.0	
1,998 /99	24.9	29.8	54.7	
1,999 /2000	24.2	43.6	67.7	
2,000 /01	24.7	52.4	77.1	
2,001 /02				90.5
2,002 /03				102.1
2,003 /04				113.6
2,004 /05				125.2
2,005 /06				136.7

Note: Import India = Total Uses - Official Supply. Source: ANZDEC (2002) ASPR Volume 2: Annexe, Table B6.17a for data from 1997/98 – 20000/01. The figures for 20001/2-2005/06 are linear projections.

These estimates imply that the informal imports from India have increased to about 71.6 percent of the total fertilizer uses in Nepal by the year 2005/06. In view of this, several steps shifts are need to improve the fertilizer supply. First, encourage the farmers to import fertilizer across the border for direct uses in their farms. Second, examine the possibility of small traders operating across the borders and arrange bigger supply towards the hills and valley. Third, revisit the policy of involving the AICL and traders to import fertilizers from

<sup>2</sup> The gross cultivated area as 3.1 million hectares; recent reports have increased it to 3.3 million hectare.

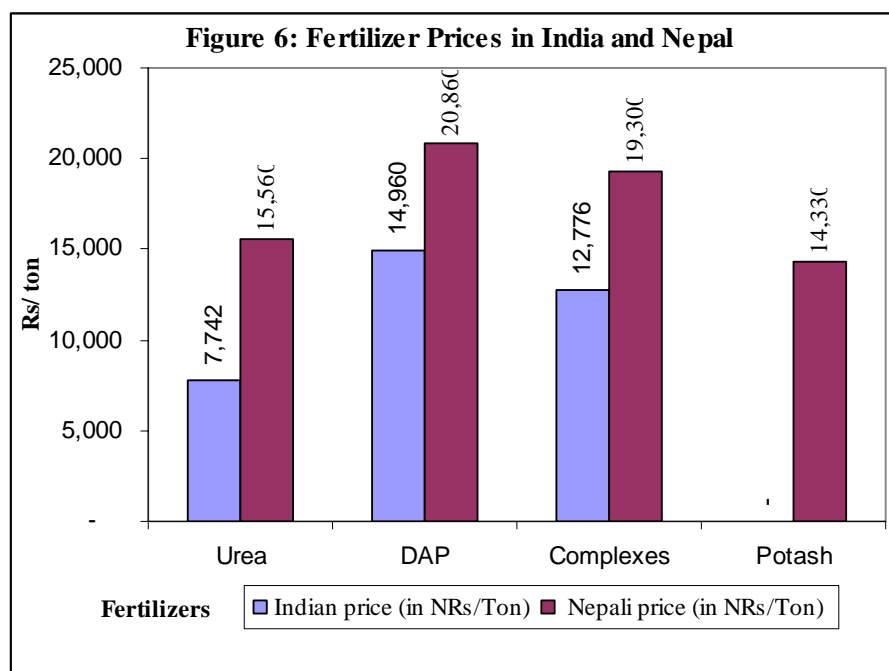
over seas countries. If Nepali farmers do not receive the subsidy as by the Indian ones, the Nepali farmers may not be able to compete with the Indian farmers.

Nepal's *National Fertilizer Policy 2058* has to be revisited in view of the influence of the Indian fertilizer policy on Nepal. India's total use of chemical fertilizers was 18.4 million Mt (nutrients) in the year 2004-05, which is up 9.5% on previous year. So the average consumption of fertilizer increased from 88.2 to 96.6 kg nutrient/ ha in this period. The government provides subsidy on imported urea, domestic productions, and sales to farmers. This subsidy increased from IRs 12,662 crores to 16,254 crores during 2003-04 to 2004-05. India imported some 3.7 million tones of fertilizers (mostly urea) in 2004-05, which comes to 20 percent of uses. On pricing the GOI Economic Survey 2004-05 (Page 168) states, "There has been no increase in selling price of fertilizers since February 28, 2002. Since the selling price of fertilizers are less than the cost of production, the differences as assessed by the Government is borne as subsidy. Due to increase in production/ consumption during 2005-06 and steep increase in feedstock/ raw material cost, this is likely to go up." The fertilizer prices in Nepal are some 39 to 101 percent higher than India (Ref Table 6 and figure 8 below). The size of fertilizer market in Nepal is about one percent of India; so Nepal can not sustain such higher prices.

**Table 6: Comparison of Prices of Chemical Fertilizers in India and Nepal**

Sr No	Fertilizers	Indian Prices (IRs/Ton) Feb. 2002	Indian Price in NRs/Ton	Nepali price (NRs/Ton)	Differences (%)
1	Urea	4,830	7,742.4	15,560	101.0
2	DAP	9,350	14,960.0	20,860	39.4
3	Complex	6,890 - 9080	12,776	19,300	51.1
4	Potash	Varies by states	-	14,330	-

Source: (1) GOI (2006) Table 8.19, Page 169 and (2) MOAC (2005) Table 9.1.2, Page 87. For Nepal, the price of complex refers to year 2002/03.



Some people insist on establishment of fertilizer factory in Nepal. The existing fertilizer factories in Nepal (about five) do not manufacture/ create any fertilizer. These firms rely in

bringing the fertilizers from India and mixing them for delivery to farmers. Such industry can survive only in the short-term. Firstly, Nepal has no raw feed stocks or materials such as naphtha, petroleum, coal, natural gas, phosphates or potash minerals. Secondly, electric power in Nepal is very costly as compared to the neighbours. Finally, the size of domestic demand is very small compared to an economic size of the fertilizer plan. In view of these considerations, a fertilizer manufacturing factory is considered unfeasible.<sup>3</sup> It would be preferable for Nepal to put share investment in the new fertilizer factories in the neighbouring countries such as India or Bangladesh. That is, consider establishment of regional fertilizer factory in South Asia. In this regard, the Foreign Exchange Regulations Act and the Technology Transfer and Foreign Investment Act, and relevant provisions under SAPTA need to be amended to make capital account convertible and to allow free trading of fertilizer. The bearings of India's Fertilizer Policy on Nepal it may be listed as follows. First, fertilizer is restricted commodity for exports by India. So Nepal should request to India for a special arrangement for export of fertilizer from India to Nepal. Second, bearing in mind the China-Bangladesh JV in fertilizer factory using the latter's natural gas resources, Nepal should also approach both India and Bangladesh try for such a JV for fertilizer factory in the region. Third, given that fertilizer prices in Nepal are very high compared to India and there is open-border, Nepal should encourage formal imports of the (subsidized-) fertilisers by paying Indian Currency from India, and initiate negotiations at diplomatic levels to fulfil Nepal's reciprocal obligations on account of using India's subsidy to fertilizers. Both countries would have added benefits because the formal restrictions on fertiliser export from India to Nepal have costs in terms of relatively larger tax-evasions due to unrecognised trade, and higher transaction cost to farmers due to smuggling and adulterations.

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<sup>3</sup> During 1997-2005, India has established under JV about five chemical fertilizer factories with a capacity of 4.4 million tones annually with buy-back arrangements. The latest one such factory was in Oman to produce ammonia at capacity 1.12 million tones per year at the cost of 0.97 billion USD.

## Chapter III

### Constraints for Improving Fertilizers Supply

#### 3.1 Major Factors- an overview

The principal factors holding back the fertilizer supplies are may be listed as follows. **Limited capacity.** The private sectors traders have limited capacity vis-à-vis public agencies for fertilizer trade and marketing activities in terms of size of equity finance, volume of bank guarantee, and infrastructures to handle the transportation and storage of fertilizer through out the year.

**Low profitability:** Nature of fertilizers supply business is that it is high volume - low profitability activity. The suppliers have low volume of transactions. So their unit costs of marketing are high as compared to the IFFCO, BCIC or MMTCI .<sup>4</sup> The AICL, private traders or government have lack of a system to maximize procurement lot sizes.

**Risk exposure ratio:** The credit finance has limitations with regard to the fertilizer imports. For example, the banks have limited capital relative to the huge funds required by a few traders to import fertilizers. In other words, the banks have difficulty to maintain the risk exposure ratio with respect to fertilizers traders. There is lack of mechanism for consortium finance for such trade.

**Transportation:** Traders face difficulty due to excess handling and transport charges. There are transport cartels. There is lack of system for destination delivery of fertilizers from the ports in Kolkotta/ Raxaul to interior regions in Nepal.

**Transit:** There is lack of transport and transit agreements with neighbouring countries.

**Storage:** The traders lack of wire-housing and storage facilities to keep the fertilizer for a long period. This is important because huge stocks are required to cater the demand for fertilizer by paddy or wheat crops within a short period to time such as the sowing period or top dressing period. The traders have limited storage capacity, buffer stock of fertilizers.

**Cash flow:** The cash flow from fertilizer trade is unsmooth over the seasons. This because of long storage period required against monthly concentrations in the demand for fertilizers applications.

**Size of national demand:** The fertilizer manufacturing and marketing environment is becoming more competitive because the suppliers' are receiving larger and regular order for fertilizers from big consumers such as India, China, Pakistan, etc. Compared to these, the size of national demand is very small to which the international suppliers would respond less enthusiastically.

**Informal trade:** Fertilizer prices in India are lower than in Nepal, so fertilizer as commodity would naturally flow from India to Nepal. But both countries have classified this as unauthorized trade. In any case, such trade is taking place but the transaction costs are very high.

The above issues are examined in the following paragraphs.

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<sup>4</sup> IFFCO is Indian Farmers' Fertilizer Cooperatives, BCIC is Bangladesh Chemical Industries Council and MMTCI is Metal and Mineral Trading Corporation of India.

### 3.2 Profile of Traders and Degree of Competition

A discussion with the importers of fertilizer held at the Federation of Nepalese Chambers of Commerce and Industries/Agro Enterprise Centre in August 2006 was held to sort out the constraints. Further, the import licences for chemical fertilizers or letters of credit (LC) for the period August 2005 to June 2006 (nine months) provide information on the profile of the traders, their numbers and volume of transactions. From the information on LC (Ref Table 7), the main findings may be listed as follows:

- i. Numbers of traders involved was: 5
- ii. Number of LC transactions was: 13
- iii. Number of banks involved to establish the LC was: 7
- iv. Total import of chemical fertilizers through LC was; 42 thousand MT
- v. Total value of imports (CIF) at port was: NRs 875 millions.
- vi. Port for overseas imports was Haldiya in eight cases for DAP and Urea.
- vii. Port for imports from India was Raxaul for ammonium sulphate (four cases).
- viii. Import of fertilizer from India was allowed if paid in USD and, in case of urea, if the country of origin was other than India.
- ix. The sources of imports are: India (4 cases for AS), USA (2 cases for DAP), China (2 cases for DAP), Egypt/ Jordan (3 cases for urea), Kuwait (1 case for urea) and Singapore (1 case for urea). The import prices CIF landing at port were as follows:
  - Ammonium sulphate Rs 17,440 (Raxaul)
  - Di-ammonium phosphate Rs 24,480 (Haldiya)
  - Urea Rs 20,340 (Haldiya), and
  - Urea Rs 21,600 (Raxaul)
- x. Average size of transaction is 3,250 MT or Rs 67.28 millions.

In general, the number of traders is few than expected to call it as a competitive business. The volume of business is small relative to the general scale of operations in the sector. There only limited number of financing institutions involved. It seems that the actual imports of fertilizer through LC may be less than the imports recorded on the MOAC publications. It appears that the traders do not have the right marketing conditions and capacity to supply chemical fertilizer to meet the total domestic market, which is around 400 thousand MT at present and growing by ...% per years. This is principally because their financing capacity and average size of procurement is too small, there are only a limited numbers of traders (who may even cartel as oligopoly) in fixation of selling prices of fertilisers.

**Table 7: Degree of Competition in Imports and Size of Transactions**

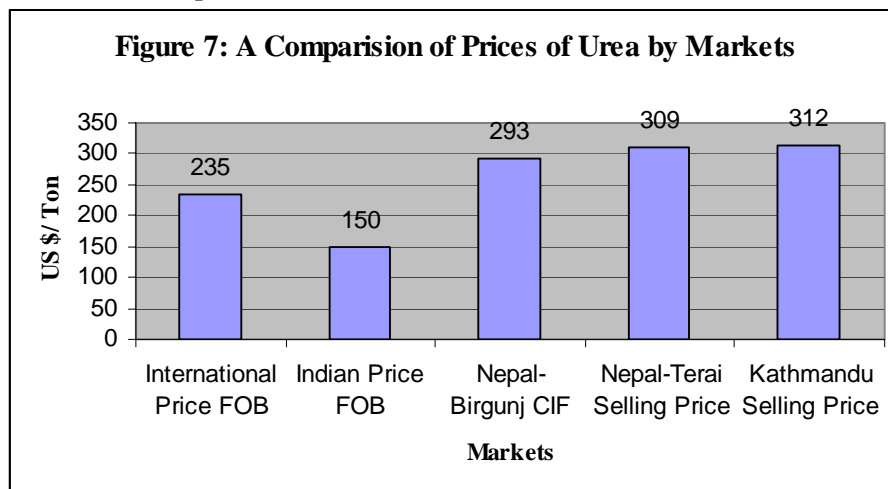
Date	Ferti-lizer	Qty (MT)	Unit	Price	Country	Total Value Thousands	NRS EXR	Total NRs Thousands	Port	Th NRs/ MT	Bank
June 2006	APS	2,500	INR/MT	10,900	India	27,250	1.6	43,600	Raxaul	17	SC Bank
March 206	APS	2,500	INR/MT	10,900	India	27,250	1.6	43,600	Raxaul	17	SC Bank
May 2006	APS	2,500	INR/MT	10,668	India	26,670	1.6	42,672	Raxaul	17	Nepal SBI
Apri 2006	DAP	3,750	USD/MT	335	USA	1,256	72	90,450	Haldia	24	Him Bank
Feb 2006	DAP	2,500	USD/MT	340	USA	850	72	61,200	Haldia	24	Him Bank
Chaitra 2062	DAP	2,500	USD/MT	340	China	850	72	61,200	Haldiya	24	N B Bank
Feb 2006	DAP	2,500	USD/MT	340	China	850	72	61,200	Haldiya	24	Sidd. Bank
Chaitra 2062	Urea	2,500	USD/MT	282	Egy/Jor.	705	72	50,760	Haldiya	20	N B Bank
Jan 2006	Urea	1,500	USD/MT	282		423	72	30,456	Haldiya	20	N B Bank
Feb 2006	Urea	5,000	USD/MT	282	Egy/ Jor.	1,410	72	101,520	Haldiya	20	N Inv Bank
Nov 2005	Urea	5,000	INR/MT	13,500	Ind/Kw.	67,500	1.6	108,000	Raxaul	22	Nabil Bank
Sep 2005	APS	2,500	INR/MT	10,220	India	25,550	1.6	40,880	Raxaul	16	Nepal SBI
August	Urea	7,000	USD/MT	276	S'poore	1,932	72	139,104	Haldiya	20	Nepal SBI
Total		42,250						874,642			
Average		3,250						67,280		21	

## Chapter IV

### Approach for Improving Fertilizer Supply

The deregulation of the fertilizer market has largely helped to increase the supply of fertilizers as required in the APP's projections. However, agricultural growth continues to be lower than expected. In this situation, there is further room to increase the quantity of fertilizer uses.

The approach to improve the supply of the fertilizers should consider the price situation in various markets. The figure below suggests that the price of urea in India is below the international prices by 85 dollars per ton (Government of India Economic Survey 2005-06, 167). The import price of fertilizer at Birgunj CIF at US\$ 293 per ton is about 25% higher than international prices and 195% higher than India (exchange rate NRs 70/\$). Thus the approach should be to import fertilizers from India.



Sources: GOI (2006) for India and Overseas, Table 7 (above) for Birgunj CIF price and Table (below for domestic selling prices).

India has a policy to subsidize the selling prices of fertilizers (urea, DAP, MOP and complexes) to encourage balanced use and make fertilizers available to farmers at affordable prices. In the year 2004/05, the subsidy amounted to IRs 162 billions in total or equivalent to NRs 7,350 per MT in gross (Table 8). Similarly, if Nepal tries to subsidize the fertilizers, the financial implications would be NRs 3.1 billion NRs annually, which is said to be unaffordable and difficult to manage. In such a situation, Nepal can not have an independent fertilizer market. Nepal must take advantage of Indian fertilizer prices, and negotiate with the Government of India to convert domestic subsidy into foreign aid for Nepal or other compensatory financial/ resource sharing arrangements.

**Table 8: Extent of Fertilizer Subsidy in India and Financial Implications for Nepal**

Particulars	Units	Amount in 2004-05
Subsidy 2004/05 in India	Mn IRs	162,539
Consumption of nutrient 2003/04 in India	Mn MT (nutrient)	18.4
Subsidy rate in India	IRs/ MT (nutrient)	8,834
Subsidy Rate Equivalent in Nepalese Rs	NRs/MT (nutrient)	14,134
Subsidy rate (using ratio 52%) in Nepalese Rs	NRs/MT (gross)	7,350
Estimated Demand in Nepal for near future	MT (gross)	430,000
Estimated subsidy for parity with India	Mn Rs	3,160

Source: Government of India: Economic Survey 2005-06, and Authors calculations

The cost of importing fertilizer form overseas might be diminished if the traders and AICL go for joint- procurement to maximize the lot sizes, which would give economies of scale in pricing and handling cost. This practice is widely practiced India for the trading of metals and minerals.

The fertilizer selling prices in Terai and Kathmandu valley are not significantly higher than the Birgunj CIF price. It might be disincentive formal import-traders. So it will be good if the government can consider the transport subsidy in international imports of fertilizers.

The marketing margins to fertilizer trade in the country are very low or not much attractive for the private traders. On the other hand, the AICL and District Co-operative Federations have underutilization of both the human and logistic facilities. So the Government should re-activate the co-operatives for sale of fertilisers.

Fertilizer transportation in the inaccessible areas is very costly. Therefore, fertilizer transportation in such areas needs to be continued.

Nepal should persuade the SAARC countries to develop mechanism for investment in regional factories of fertilizer, and free trade of fertilizers and common agricultural policy.

The growth targets in the Agricultural Perspective Plan relied heavily on uses of fertilizers. However, there is need to other sources of agricultural growth such as irrigation, organic manures, improvements of seeds and varieties, change to high value crops and commodities, marketing efficiency, post-harvest handling and processing. A detailed discussion of these aspects to agricultural growth and development is outside the scope of the present work.

Most of the discussion thus far has been on measures to increase the supply of fertilizers to meet the domestic demand. The next section will be devoted to the assessment of the size of the demand for fertilizers, or the economics of fertilizer uses.

## Chapter V

### Size of Domestic Demand for Fertilizers

#### 5.1 Fertilizer Use by Crops

The MOAC's present statistical system does not provide data on fertilizer uses by crops. We have analysed the CBS Agricultural Census to obtain data on fertilizer uses by crops. These are presented below as Table 9 below. It shows that about 47 percent of the fertilizer is used for paddy, followed by wheat 25 percent, and maize 14 percent. So 86 percent of demands for fertilizers come from the cereal crops. These crops may not be able to compete with neighbouring economies due to differences in productivity of land or labour and difficulty to protection through exchange rates or tariffs. Thus, the growth of demand for fertilizers for these crops may not be very great.

The alternative crops such as potato, vegetables, sugarcane and plantations receive only 14% of the mineral fertilizer applications. This is low in view of their share in the agricultural outputs or their future potentials for growth. Therefore, it is suggested here that the Government and farmers should emphasize applications of fertilizers for high value crops. In the following sections, the optimum demands for fertilizer are inferred based on the case of production of paddy.

**Table 9: Fertilizer Uses by Crops**

S/N	Crops	Total cropped area (Ha)	Fertilizer applied cropped area (Ha)	% Area treated with fertilizer	Mineral/ chemical fertilizer used (Kg)	Kg/ Ha for fertilizer applied area	Ka/Ha for total cropped area	% fertilizer uses
1	Paddy	1,544,604	1,033,135	67	135,259,592	131	88	47
2	Maize	769,421	255,087	33	38,691,874	152	50	14
3	Wheat	793,510	454,230	57	72,232,762	159	91	25
4	Potato	83,855	25,861	31	8,178,342	316	98	3
5	Sugarcane	51,923	38,182	74	6,917,677	181	133	2
6	Vegetables	60,019	22,044	37	7,520,766	341	125	3
7	Other crops	687,043	173,577	25	16,848,878	97	25	6
	<b>Total</b>	<b>3,990,375</b>	<b>2,002,115</b>	<b>50</b>	<b>285,649,891</b>	<b>143</b>	<b>72</b>	<b>100</b>

Source: CBS (2004) Table 9 for area treated with mineral/ chemical fertilizer and quantity used, table 7 for total cropped area, table 6 for area under temporary crops

#### 5.2 Economics of Fertilizer Use for Paddy, and Its Generalisations

For an optimum condition, the farmers are expected to equate the marginal product (MP) of agricultural production with the marginal cost (MC) of the fertilizer applications for deciding the doses of fertilizer. For such equilibrium to reach, we must have empirical estimates of (a) the production function, (b) farm gate prices for outputs, and (c) farm gate prices for fertilizers.

We suspect that the farmers' business demand for fertilizers itself is low. The Agricultural Sector Performance review 2002 had estimated the paddy yield response function with respect to fertilizers, irrigation, variety, and dummies for mountain and hill regions (whereas, terai is

taken as the control region). The main results are summarised below in Table 10. Based on this information, we may express the yield response function for fertilizer in quadratic form in terms of kg per hectare as follows:

$$\text{Yield} = 2,654.2 + 11.23 (\text{NPK}) - 0.038 (\text{NPK})^2 + \dots ,$$

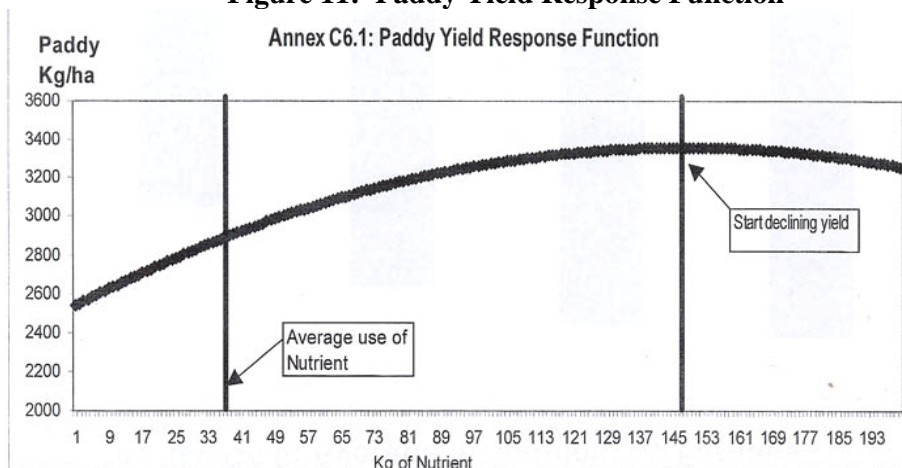
The yield response function suggested that the present level of fertilizer uses is 33-41 kg/ ha and the paddy output will increase till fertilizer application rate reaches to 145 kg/ ha (Figure 8). The ASPER used this technical relation to argue for elimination subsidy. Along side with this total productivity curve, we have estimated the marginal productivity curve (Ref Figure 9). In the diagram for the marginal productivity curve, the pair of numbers refer to the kg of fertilizer /ha and the corresponding marginal productivity.

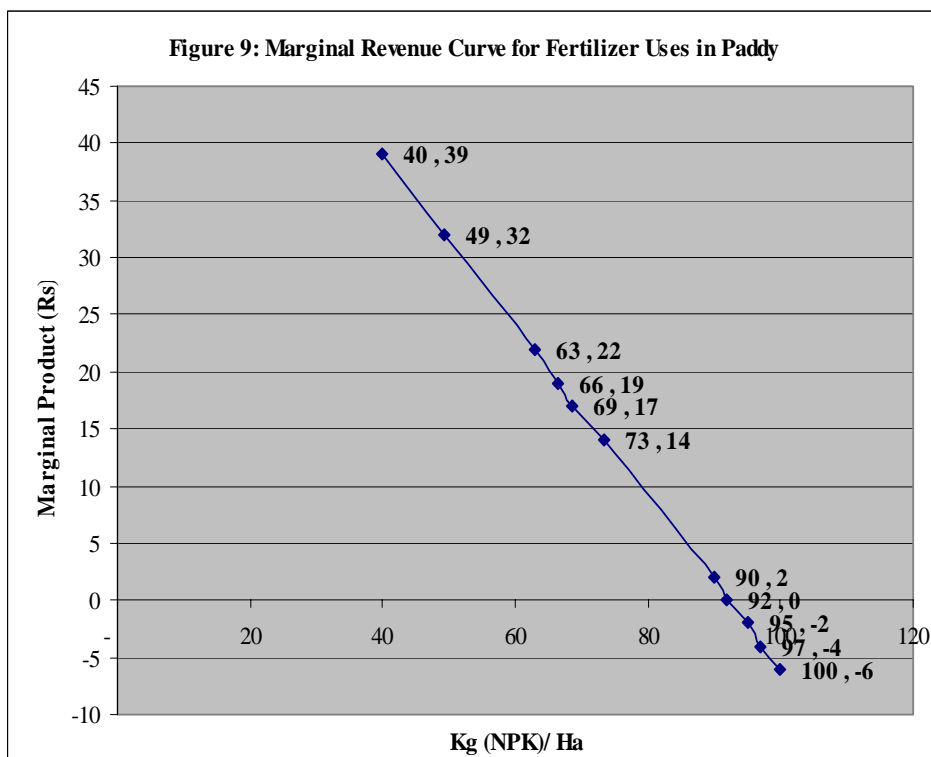
**Table 10: Paddy Yield Response Function**

	Coefficients	Stat	Average
Intercept	2,654.2	102	
npk	11.23	5.3	33
(npk) <sup>2</sup>	-0.038	-2.7	2,705
Irrigation	652.2	8.0	0.67
Variety	-507.6	-6.2	0.65
Mountain	-1,086.0	-10.0	
Hill	-181.2	-2.0	
Adjusted R <sup>2</sup>	0.33		
Average response to nutrients	85		
Elasticity of yield response to nutrients	0.11		
Observations	719		

Source: Selected Indicators from ANCDEC (2002), Table Annex b6.20

**Figure 11: Paddy Yield Response Function**





### 5.3 Fertilization Rates, and Farm Gate Prices of Output and Inputs

To determine the present level of fertilizers uses, we refer to trend projections, agricultural census, Nepal Fertilizer Use Study, etc. The trend shows that fertiliser uses has reached 136.7. Nearly half of all fertilizer used goes to paddy. So the fertilizer application rate for paddy is 68 kg. The estimates of fertilizer use rates are as follows:

Studies	nutrient Kg/ ha
• Present projections	68.6
• Nepal Fertilizer Use Study (MOAC 2003):	63.0
• Agri Sample Census (for area treated with fertilizer) (CBS 2004)	73.4
• Do (for average of all area under paddy) (CBS 2004)	49.2
• Cost of Production Studies ( DOA 2062)	66.4

The data on the farm gate price of agricultural commodities are obtained from case studies on the cost of production by individual commodities. The results in table 11 below shows that the simple average of the farm gate price of paddy is Rs 9.76 per kg for year 2003/04, which represents conditions such as local/ improved varieties and irrigated/ unirrigated land in some 22 districts (DOA 2062).

**Table 11: Farm Gate Price of Paddy and fertilizer Application Rates 2003/04**

Sr No	Districts	Types of Variety	Water supply	Price of paddy Rs/Kg	Use of fertilizer Kg/ha
1	Jhapa	Local	Irrigated	12.00	105
2	Solu	Local	Un-irrigated	10.25	65
3	Nawalparasi	Improved	Irrigated	10.10	90
4	Sunsari	Chaite	Irrigated	9.45	110
5	Bhojpur	Improved	Un-irrigated	9.50	120
6	Salyan	Improved	Un-irrigated	10.05	100
7	Gulmi	Improved	Un-irrigated	9.90	135
8	Nuwakot	Improved	Un-irrigated	10.05	170
9	Makawanpur	Improved	Irrigated	10.08	115
10	Parbat	Improved	Irrigated	9.75	155
11	Tanahau	Improved	Irrigated	9.90	130
12	Achham	Improved	Irrigated	9.20	85
13	Banke	Improved	Un-irrigated	9.35	120
14	Dang	Improved	Un-irrigated	9.65	105
15	Chitwan	Improved	Un-irrigated	9.90	130
16	Mahottari	Improved	Un-irrigated	9.25	105
17	Morang	Improved	Un-irrigated	9.10	100
18	Banke	Improved	Irrigated	9.35	155
19	Makawanpur	Improved	Irrigated	9.65	120
20	Chitwan	Improved	Irrigated	9.90	160
21	Mahottari	Improved	Irrigated	9.25	110
22	Morang	Improved	Irrigated	9.10	125
	Total			214.73	2610
	<b>Average</b>			<b>9.76</b>	<b>118.64</b>
	Nutrient rate		<b>56%</b>		66.44

Source DOA (2062)

For fertilizer, the relevant price is farmers purchase price. The MOAC has obtained the fertilizer sales prices in the districts through communications with the District Agricultural Development Offices (DADOs). For the year 2005, the average price of DAP was Rs 26.70, urea 20.53 and murato of potash 7.02 per kg (Ref Table 12). This price is based on district sales depots. In addition, one may have add the transportation cost of agro-vet centres, their profit margin, farmers transportation costs and the interest cost to farmers for the purchase of fertiliser. The sales price of agro-vet centres are generally higher because they usually do not get commissions from traders, and have to add transportations costs.

To arrive at the prices of fertilize nutrients, we have worked out the total proportion of uses of urea, DAP and MOP for year 2004/05, and the price of each nutrient. We take weighted average of nutrient price which turned to be Rs 37.15 per kg. Then, to consider the farmers cost from the dealers-point onwards, we increase the price by 10%. Finally the effective price of the farmers turns out to be Rs 40.87 per kg of NPK nutrients.

**Table 12: Selling Prices of Fertilizer by Districts in 2062 Bs (2004/ 05)**

	Districts	Urea	DAP	AS	SSP	APS	MOP	Compl ex	Mixe d	Zinc sulphhate	Nimkh ali
<b>Rs/ MT in 2063</b>											
	Birgunj	24,500	27,500	11,200	7,850	18,975					
	Eastern DR		27,000								
	Bhairahawa		27,500			19,500					
	Nepal gunj		27,500		8,000	19,500					
<b>Rs/ quintal in 2062</b>											
1	Surkhet	1,800	2,578				1,410		2,233		
2	Biratnagar	2,683	2,686					1,900	2,000		
3	Dhankuta	2,050	2,500				1,700				
4	Banke	2,800	2,682					2,050	2,060		
5	Rupandehi	1,700	2,775				1,600	1,988			
6	Janakpur	1,700	2,783				1,500	2,100			
7	Kailali	1,574	2,618				1,360	2,175			
8	Parsa	2,500	2,590	1,600	860		1,400	1,900	2,000	4000	1500
9	Doti	1,900	2,600				2,000				
10	Palpa	1,700	2,600				1,700	2,000	2,000		
11	Gulmi	1,925	2,550				1,700				
12	Parbat	2,200	2,800				2,000		2,200		
13	Lamjung	2,000	2,800				2,000				
14	Kaski	2,000	2,800				2,200				
15	Doti	2,000	2,800				1,800				
16	Dadeldhura	1,800	3,000				1,800				
17	Lalitpur	2,550	2,650	1,630			1,650		2,100		
18	Kavre	2,060	2,587				1,733				
19	Bhaktapur	2,135	2,570				1,475				
20	Kathmandu	1,990	2,430	1,350			1,600	1,965	1,860		
	Cases	20	20	3	1		18	8	8	1	1
	<b>Average</b>	<b>2,053</b>	<b>2,670</b>	<b>1,527</b>	<b>860</b>		<b>1,702</b>	<b>2,010</b>	<b>2,057</b>	<b>4,000</b>	<b>1,500</b>
<b>Memo items</b>											
	Kavre	2,060	2,577				1,480		1,860		
	Kath valley	2,145	2,583				1,563		1,933		
	Birgunj (Manoj)		2,700	1,200	800				1,870		

Source: Based on Analysis of District Agriculture Office reports at the MOAC/ fertilizer Unit.

#### 5.4 Marginal Revenue and Optimum Level of Fertilizer Uses

Based on the above (a) quadratic production function, (b) farm gate prices for outputs, and (c) farm gate prices of fertilizer prices, Figure 9 above presents the estimated marginal revenue product and the optimal conditions for fertilizer uses by the farmers. According to this, the estimates of the fertilizer application rates range from 63-68.6 kh NKP/ hectare at present, and its marginal revenue product varies from Rs 17-22 per Rs invested to apply the fertilizer. However as the fertilizer application rates go up to 92 kg/ ha, the MRP reduces to zero and turns negative above it. In other words, there would be demand for fertilizer till the application rate of 92 kg (NKP)/ hectare, and no demand for fertilizer beyond this, given other things, namely production technology, input price, output price and so on. In addition, table 11 above shows that the elasticity of yield response to nutrients is as low as 0.11.

To obtain aggregate figures, if we round the present fertilizer use to 70 kg/ ha, assume crop area as 3.3 million ha and nutrient rate 56%, the present total demand for fertilizer is 412.5 thousand MT. Likewise, to obtain the optimum demand for fertilizer under the present uses of 92 kg/ha, the total demand for fertilizer comes out to be 542 thousand MT, which is a 32 percent increase.

## Chapter VI

### Policy Reforms to Improve Supply of Fertilizers

**Immediate terms**, the following reforms in policy are needed to improve the supply of fertilizers.

In the immediate terms (1-2 years), the following actions need to be taken.

- i. There should be system to estimate the actual uses of fertilizers (both formally imported and unrecorded imports) at the farmers' level and the farm gate prices of the fertilizers.
- ii. The macro decisions to supply fertilizers should be founded on the farm households' decisions on optimum amount of input uses. In the absence of such information, there should be system to estimate farm household level production functions by crops such that it is possible to know their optimum points in relation to prices of chemical fertilizers, and prices of the farm outputs.
- iii. Nepal's fertilizer market is merely one percent of that in India. The price of fertilizers is very high in Nepal relative to India and International market. So the traders and farmers will benefit from the import of Indian fertilizer. However, there are restrictions on. The Government should facilitate the (informal) import of fertilizers from India by making it legal activity. In this context, it is important to promote growth of small traders to import fertilizers from India, and sale it in the interiors parts.
- iv. The AICL and co-operatives have huge unused human, logistic and even financial resources to carryout fertilizer imports and marketing. The Government should encourage it. In addition, the private traders of fertilizers should be allowed to use the go-downs/ warehouse of the AICL and cooperatives, **which are under-utilized**.
- v. Government and Chambers of commerce should arrange for consortium finance of large traders for over seas imports of fertilizers. The Government and Central Bank should consider providing government guarantee for big imports of fertilizers,
- vi. The Transit Treaties allow for the transportation but it remains to be effectively used to allow for destination delivery of fertilizers from the Kolkotta/ Raxaul ports to Nepal's interior area. This is more applicable because fertilizer is an essential commodity.
- vii. Arrange for lot procurement of fertilizers in the International market by pooling the resources and businesses of the traders, AICL and Cooperative apex body, when it becomes active.

**In the medium term** (3-5) years, the following actions need to be taken

- i. Arrange for fertilizer shipment through JNPT/ Mumbai to western parts Nepal,
- ii. Arrange for import of fertilizers for mountain region border areas via Tibet/ China,
- iii. Arrange for equity investment in the Bangladesh and Indian fertilizer factories,
- iv. In the Nepal-India Trade Treaties, propose to make fertilizer trade a freely traded commodity.

**In the long term** (5 years or more), the following actions need to be taken.

- i. Plan for regional factories of fertilizer such as those as done in the South-East Asia; and
- ii. Under SAFTA, propose make fertilizer a freely traded commodity in South Asia and harmonise the agricultural policies of the countries in the region.

## Chapter VII

### Policy-Action Matrix (Pam)

The conclusions and recommendations of the present study restated in the framework of policy action matrix (PAM) as follows.

**Policy Actions Matrix for Constraints and Approach for Improving Fertilizer Supply for Meeting Domestic Demand**

S.N	Constraints	Recommended improvement/ action	Activities	Indicators	Time frame	Responsible agency
<b>A</b>	<b>Policy</b>	Review fertilizer subsidy policy in the light of international practice to subsidize the farmers.	Overall literature review with focus on developing countries; Review WTO provisions aggregate measures to support agriculture	Recommendations to the MOAC and MOF in determining the extent of subsidy on fertilizer for farmers; Institutional and delivery mechanisms for the above; Roles of AICL and traders redefined.	one years	MOAC, NPC, MOF
		Involve private sector importers in policy dialogue in real terms	Sense of responsibility is developed amongst the traders.	Frequency of meetings attendance by private sector is increased.	Immediate	MOAC/NCCI/FNCCI
		Explore possibility to avail financial resources from multi-lateral agencies to private sector	Coordinate with World bank, Asian Development Bank etc , Government make	WB/ AsDB demonstrate willingness to provide finance fertilizer import business	Six months	<ul style="list-style-type: none"> <li>• MOAC/MOF</li> <li>• AsDB/ WB</li> <li>• NCCI</li> </ul>
<b>B</b>	<b>Institutional</b>	Fertilizer Unit to develop a mechanism to embrace private sector activities	Establish a separate unit involving private sector in the fertilizer cell focused to assist private sector fertiliser importer and dealers	A unit is established in MOAC. Private sector assumes ownership of this unit.	3months	MOAC/DOA/NCCI/FNCCI
		Involve cooperative in fertiliser distribution	Study the operations of IFFCO and draw lessons for Nepal; Revisit the role of co-operatives in fertiliser marketing in Nepal in the past, present and future.	Co-operatives are activated in the distribution of fertilizers;	1 year	Department of Co-operatives

		Study possibility of joint importation of fertilizers with Indian importers private vis-à-vis public sector like MMTC.	In-house exercise on policy adoption; Exchange of views with the MMTC and BCCI; Fielding of consultants	Develop mechanisms among Nepali traders for joint-procurement of fertilizers to take advantage of lot procurement like done in the case of vegetable oil importation; Report on procedures for inter-country co-operations by traders and public corporations.	1-2 years	Ministry of Commerce, Ministry of Agriculture and Co-operatives; National Trading Corporations. Nepalese Embassies in Indian and Bangladesh; MMTC India, BCCI Bangladesh.
		Activate the Agricultural Input Company Ltd (AICL) and other public undertakings like National Trading Limited (NTL) to deliver services in line with its formation order.	Review the reasons on why AIC has not been able to increase its business; Facilitate AICL and NTL in undertaking its responsibility like provision of sufficient financial resources by the government; Encourage private participation in management and investment in AICL; Study the possibility of listing AICL in stock exchange;	Public sector agency gets sufficient resources to undertake the business. Increase in fertilizer supply including the buffer stock	1 year	MOAC, MOAF, AICL, NTL, Nepal Rastra Bank
<b>C</b>	<b>Infrastructures or logistics</b>	Enhance the use of storage capacity available with the public sector.	Avail storage capacity available to private sector on pay basis.	Private sector uses the existing storage facilities available with AICL and co-operatives.	6 months	MOAC, AICL, District Co-operative Unions, Private traders
		Encourage direct delivery of fertilizer from sea port/ railway stations to various destinations in Nepal	Review the transport transit, especially, Indian/ Nepali trucks movements between Nepal and India; Study the exiting handling costs and tariffs, and time lost under the exiting transshipments along the corridor due to non-allowance of Indian vehicular movement in Nepal by various Nepalese Truckers Associations.	The transportation cost and delays in fertiliser supply go down.	6 months	MOAC, Ministry of Transports, Truckers Associations,
		Examine additional supply lines/ routes	Explore possibility of importing fertilizer via Lahsa port if western China has emerged as exporter of fertilizer	Advise on transport and feasibility done	6 months	MOAC, Ministry of Transports,

<b>D</b>	<b>Research and development</b>	Revisit economy of fertilizer use calculation to determine cost benefit ratio by crops/ enterprises	Estimate the production functions and cost functions at the farm level to analyse the household economy on fertilizer uses; Compare between subsidy on food transportation and match with increase in productivity vis-à-vis mentioned transportation cost. Develop mechanisms to provide additional transport subsidy for fertilizer in the inaccessible hills/ mountains.	Levels of fertilizer uses for which it is profitable for farmers; Amount of subsidy required;	1-2 years	Department of agriculture. National agricultural Research Council
		Conduct feasibility to establish fertilizer factory in the country, Joint venture arrangement in SAARC countries.	Review the power required/ available to run the fertilizer plant; Review the fertilizer plant's possible raw materials/feeders (naphtha, natural gas, fuel oil, coal, phosphate/ potassic minerals) in the country; Mediate with the Bangladesh Chemical Industries Corporations (BCIC) for joint-venture arrangements; Re-examine the Foreign investment policy, especially, capital account convertibility. Carryout similar inquiries with India	Feasibility of the idea tested; Nepalese entrepreneurs identified for investment in fertilizer factory in the neighbouring country; Identification of appropriate agency from Bangladesh/ India; Nepalese law changed to enable outward investment.	1-3 years	Ministry of Industry; SAARC Chamber of Commerce; Ministry of Finance, Nepal Rastra Bank.
		Determine level of use as various estimation is available	Survey at entry point Focus group with retailers/importers Farmers field enumeration	Exact quantity of NPK use per ha.	1 year	Ministry of Agriculture and Co-operatives,
<b>E</b>	<b>Miscellaneous</b>	Government should be accountable in provisioning of fertilizer to the farmers.	Develop public –private partnership in provisioning fertilisers; Develop the capacity of private sector – both in their numbers and volume of business- to deliver more fertilizer.	Sufficient quantities of fertilizer are readily available during cropping applications seasons.	On-going	MOAC, MOF, Banks
		Government of Nepal revisit the subsidy policy in the light of fertilizer policy in India	Identify measures to make Nepalese fertiliser prices in line with Indian fertiliser prices	Smooth trade on fertilizer between the two countries.	1-2 years	Government of Nepal and Government of India.

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## Appendix Tables

**Annex Table 1: India's Exports of Fertilizers to Nepal (000 Ton)**

Fertilizers	Years									
	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2003-04	2004-05	
Urea	12	10	14.69			65.83	15.72	18.75	63.37	
AS								4.66		
ACI									5.62	
SSP						2.16	1.38	5.41	1.1	
DAP									4.67	
MOP									1.1	
NPK(15-15-15)									0.5	
<b>Total</b>	<b>12</b>	<b>10</b>	<b>14.69</b>	<b>0</b>	<b>0</b>	<b>67.99</b>	<b>17.1</b>	<b>28.82</b>	<b>76.36</b>	

**Notes:**

- Under the Export-Import Policy, exports of all chemical fertilizers are restricted for which permission is required. The figure from 1993-94 to 1999-2000 are approved actual exports based on permission granted by the government of India for exports.
- The figures for 2000-01 to 2003-04 are actual export figures for those companies who have reported to Dept of fertilizers. However, there are other companies also to whom Dept of fertilizer Issued NOC for export of their fertilizers and data are awaited from them.
- India exports fertilizers to Nepal, UK, B'desh, Sri Lanka, Indonesia and UAE.

**Annex Table 2: India's Joint Ventures Abroad in Fertilizer Sector**

Company	Location	Participants	Project Cost (US \$ MN)	Date of Commissioning	Product	Capacity ('000 ton/annum)	Buyback arrangements
ICS, Senegal	Senegal	IFFCO, SPIC, GOI, ICS-Senegal	571	2002	Phosphoric acid	660	100% up to 555,000 ton
Indo Jordan Chemicals Co.	Eshidiya, Jordan	SPIC, JPMC, Jordan, The Arab Investment Co	170	1997	Phosphoric acid	224	100%
Indo Morac Phosphore AS.	Lorf Lasfer	Chambal fert. & Chem OCP, Morocco	205	1997	Phosphoric acid	330	Up to 70%
SPIC Fert Chem Ltd	Jabel Ali, Free Zone Dubai	SPIC, MCN & ETA Dubai	170	2005	Urea	400	
Oman India Fert Ltd	Qualhat, Sur, Muscat, Oman	KRIBHCO, IFFCO, OMAN OIL Co, Oman	968.2	2005	Ammonia	1155	
					Urea	1652	100%
<b>Total</b>			<b>2,084</b>			<b>4421</b>	
<b>Average</b>			<b>416.8</b>			<b>884.2</b>	

Source: The Fertilizer Association of India (Dec 2004) Fertilizer Statistics 2003-04

#### 4. List of Fertilizer Importers/Producers

S.N.	Importers	Address	Telephone No.	Fax No.	Email address	Contact person	Brand name of fertilizer
1.	Agriculture Inputs Company Limited	Kuleshwar, Teku, Kathmandu	4279497 4279716	4279363	aic@ntc.net.np	Mr. Jagannath Dulal	कृषक ब्राण्ड
2.	Manoj International Traders	Lipani, Bara, Nepal, Tripureshwar, Kathmandu, P.O.Box No. 418	4225124 4244993	4220804	<a href="mailto:narayani@ecomail.com.np">narayani@ecomail.com.np</a>	Parmeshwar Lal Chachan Uttam Mainali	त्रिशक्ति
3.	Bikash Intercontinental	Dugar Niwas, P.O.Box 485 Kantipath, Ktm	4225009 4248633 4228813	4248695	tmdugar@info.com.np	Motilal Dugar	ट्रयाक्टर छाप
4.	Bhudeo Trading	Golchha House P.O.Box No. 4028, Kath.	4250001	4249723	<a href="mailto:imports@golchha.com">imports@golchha.com</a>	Mr. Lok Man Golchha	गहुवाली ब्राण्ड, हलो ब्राण्ड
5.	Hanshraj Hulashchand Golcha & Co. Pvt. Ltd.	Golchha House P.O.Box No. 4028, Kath.	4250001	4240723	<a href="mailto:ktm@golcha.com">ktm@golcha.com</a>	Mr. L.B. Singh	गोल्छा ब्राण्ड
6.	Salt Trading Corporation Limited	Kalimati	4271208 4270315	4271704 4282111	<a href="mailto:stcbusiness@hotmail.com.np">stcbusiness@hotmail.com.np</a>	Mr. Binod Chaudhary	साल्ट ट्रेडिङ ब्राण्ड
7.	National Trading Limited	Teku	4228685 4227683	4225151	<a href="mailto:natreli@mos.com.np">natreli@mos.com.np</a>	Mr. Shyam Krishna Shrestha	
8.	Dugar Bro. Concern	P.O.Box 1991, Charkhal, Dillibazaar, Kathmandu	4437991 4437993 4439908	4437990	<a href="mailto:dugarktm@mos.com.np">dugarktm@mos.com.np</a>	Mr. Pramod Adhikari	Urea: IFFCO DAP: महावीर ब्राण्ड
9.	National Cooperatives Federation of Nepal Ltd.	PO Box 11859 Bijulibazaar, Kathmandu	4781697 4781337	4781337	<a href="mailto:ncfbusiness@wlink.com.np">ncfbusiness@wlink.com.np</a>	Mr. Ram Bhajan Shah, DGM	Urea: IFFCO
10.	Arun Enterprises,	P.O.Box 2523, 6/10, Safia Niwas, II floor, New Road, Kath.	4225047 4232832	4255284	<a href="mailto:ajay_goenka@hotmail.com">ajay_goenka@hotmail.com</a> <a href="mailto:goenka_btw@wlink.com.np">goenka_btw@wlink.com.np</a>	Ajay Goenka	DAP: Krishak DAP APS:
11.	PK Traders	GPO 3114 Thapathali, Kathmandu	4260910 4260056 4260810	4226309	<a href="mailto:murarka@mos.com.np">murarka@mos.com.np</a>	Madhav Dhakal	
12.	Durga Malkhad	Gallamandi, Bhairahawa-6, Rupandehi	071-520584 071-523464	071 521214	<a href="mailto:pfmpl@yahoo.com">pfmpl@yahoo.com</a>	Narayan Barahi	Durga Malkhad
Producers of mixed fertilizers							
13.	Purbanchal Fertilizers (P) Ltd.	Siddharthanagar - 6, Gallamandi, Bhairahawa, Nepal	071 524584 071 520584	071 521214	<a href="mailto:pfmpl@yahoo.com">pfmpl@yahoo.com</a>	Narayan Barahi	सगरमाथा
14.	Bagmati Fertilizers (P) Ltd.	Katahari - 7, Biratnagar, Nepal 98510-55379	021 526083 021 533753	021 533752 4-260809	<a href="mailto:bagfert2002@yahoo.com">bagfert2002@yahoo.com</a>	Shanwarmal khetan -Madhav Dhakal	सोना मल
15.	Pathibhara Agro Fertilizer Pvt.Ltd.	Katahari-6, Morang	021-523847		<a href="mailto:rajeshbtr3@hotmail.com">rajeshbtr3@hotmail.com</a>		हिरा मल

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