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## **Impact of Reforms in Agricultural Extension System in India: A Case Study of ATMA districts under NATP in Bihar**

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### **Introduction**

The main extension system primarily responsible for delivery of technical messages is operated by the State Department of Agriculture (DOA), through the state, district and block level machinery. Other state departments, such as Animal Husbandry, Horticulture, Soil and Water Conservation, and Fishery have been providing very limited extension services. The research centres and agricultural universities are also playing a limited role in extension services. During the mid-1990s, the Government of India and the World Bank began exploring new approaches to extension that would address these system problems and constraints. The result was a new, decentralized extension approach, which would focus more directly on agricultural diversification and increasing farm income and rural employment. The central institutional innovation that emerged to address these system problems was the Agricultural Technology Management Agency or “ATMA” model that was introduced at the district level to:

1. Integrate extension programs across the line departments (i.e., more of a farming systems approach),
2. Link research and extension activities within each district, and
3. Decentralize decision-making through “bottom-up” planning procedures that would directly involve farmers and the private sector in planning and implementing extension programs at the block and district-levels.

This model was pilot-tested through the Innovations for Technology Dissemination (ITD) component of a World Bank-funded, National Agricultural Technology NATP (NATP) that became effective in 1998 and concluded in June 2005. As a follow up on the success of ATMA model under ITD component of NATP the Govt. of India has initiated a new Centrally Sponsored Scheme on Support to State Extension Programmes for Extension

Reforms, and had funded the setting up of Agricultural Technology Management Agency (ATMA) in all 588 rural districts in India.

The present study has been undertaken to measure the impact on ATMA established under ITD component of NATP the Govt. of India in Bihar, and to find whether they are able to fulfill their mandate by becoming more broad-based and participatory for planning, implementing and monitoring the extension activities of a district.

### **Methodology**

Impact assessment included both the process and outcome of the NATP on the crop yields and farmers' income, etc. assessment of impact on the technology dissemination system and processes was conducted over the period of three years (from 2002 to 2004) by IIM, Lucknow along with routine monitoring & evaluation at different levels, i.e., state, district, block and village levels. In addition, special field visits were made to revisit the data collected by the IIM, Lucknow so as to have a comprehensive and terminal assessment of the functioning of the new institutional arrangements being pilot tested in the NATP districts.

For evaluation of field level impact of ATMA model, beneficiaries (target farmers) were compared with themselves across the pre-intervention and post-intervention scenarios. To facilitate such temporal comparison of agro-economic situations facing the target farmers, baseline and impact assessment surveys were conducted to reflect upon pre-intervention and post-intervention scenarios respectively. Further, in order to provide reflections upon 'with NATP' and 'without NATP' situations inclusion of out-of-NATP area farmers in the sample was necessary, and accordingly sample farmers from control districts were also covered under the study.

The baseline taken for the study was the same as done by IIM, Lucknow during the period of June-July 2002, which was more on recall basis with reference to the pre-NATP crop year. Reference crop year for baseline survey, therefore, varied from district to district depending upon the year of NATP launch. The impact survey by IIM, Lucknow was conducted during the period June-July 2004, with reference to crop year 2003-04, however during revisiting for the current study, data was also recorded for crop year 2006-07 from the same set of sample villages and farmers.

The study was conducted through pre-tested semi-structured interview schedule keeping in mind the final output and outcome/impact indicators. The units of data collection included selected households as well as community organizations (FIG and SHG, etc.). Sample units were selected through multi-stage stratified random sampling method. Adequate number of sample households representing different farm-size classes was selected from each region. In order to have a comparative picture of temporal changes in non-NATP areas vis-à-vis NATP area, a set of households from non-NATP district were also selected. For comparison, three villages equidistant from three circles/clusters of equal distance from non-NATP districts were selected randomly as control.

From each of the NATP districts 9 representative villages (3 villages from each of the three equidistant blocks) and 15 farmers (from each selected villages) representing different land holding classes were selected randomly. Similarly, 15 sample farmers from each selected villages from non-NATP district, representing different farm-size classes were selected as control. Total sample size was 540 (405 from NATP districts and 135 from non-NATP districts). The farm level impact thus measured has been discussed in the following sections of this paper.

**Table- I: Number of selected districts, blocks, villages and farmers in different districts**

Particulars	NATP district	Non-NATP district (Control)	Total
Districts	1	1	2
Blocks	3	1	4
Villages	9	3	12
farmers	135	45	180

### Results and Discussions

Land holding, irrigation, cropping intensity, diversification and affiliation with Farmers' Organizations has been presented in Table-2. A perusal of this table shows that the average operational holding was observed to be the largest in Munger (3.02) and the smallest in Madhubani & Patna in case of NATP district and Banka (3.48) being the largest in non-NATP district and Nalanda and Darbhanga being the smallest. Over the period, size of operational holding has marginally increased in Munger (0.48) followed by Madhubani and Patna. Proportion of gross cropped area receiving irrigation shows that Madhubani and Patna had relatively higher irrigated area compared to other districts and the increase in the irrigated area was also high in both the NATP and non-NATP districts.

The change in the cropping intensity indicates that it increased marginally in both the NATP and non-NATP districts but this increase was higher in the NATP district Munger than in the any non-NATP district. This can be attributed to the fact that in NATP district, efforts were made to introduce new crops, especially horticulture crops while in non-NATP districts efforts were made by various on going programme but was relatively weak and also major focus was on superior cereals (Table-2).

The extent of diversification of cropping system was assessed comparing the cropping pattern across pre and post-NATP situations. On an average, some shift in the cropped area under horticulture, oilseeds and medicinal and aromatic crops from superior cereals was noticed in both the NATP and non-NATP districts. But across districts the shift was relatively higher in the NATP districts than in non-NATP districts in the state. However, across different NATP districts, the net shift area was quite high in Madhubani (14.26 percent as compared with Nalanda the non-NATP districts where the cropped area shifted by 15.62 percent (Table-2).

**Table-2: Comparative situation of different indicators in NATP and Non-NATP districts in Bihar**

	NATP District			Non NATP District		
Average operational holding per household (ha) in different Districts.						
	Patna	Munger	Madhubani	Nalanda	Banka	Darbhanga
Baseline	2.04	3.02	2.04	2.18	3.48	2.18
Current	2.22	3.5	2.22	2.18	3.48	2.18
Change	0.18	0.48	0.18	0	0	0
Percentage irrigated area (as % of gross cropped area) in different districts						
Baseline	93.5	65	93.5	92.6	90	92.6
Current	97.3	83.7	97.3	97.7	94.6	97.7
Change	3.8	18.7	3.8	5.1	4.6	5.1
Cropping intensity (Percent) in different districts						
Baseline	199	147	199	185	185	185
Current	200	187	200	191	200	191
Change	001	040	001	006	015	006
Percent of gross sown area under horticulture crops and oilseeds.						
Baseline	7.5	4.5	3.31	14.58	0	0.61
Current	11.42	4.0	17.57	30.60	0	3
Change	3.92	(-)0.5	14.26	15.62	0	2.39
Percent of households affiliated with FO						
	38.90	28.9	60.23	-	-	-

These fluctuations may be attributed to the fact that in case of Munger the percent sown area in mustard declined due to poor market rates in the previous year and in case of Nalanda the demand price of potato increased and the sown area also increased marginally leaving scope for more expansion.

Table-2 also reveals that majority of households in the NATP districts were associated with farmer's groups/organizations as the NATP approached the groups rather than individual farmer. It may also be noted that size of holdings in Munger was higher than in the other NATP districts. Madhubani had highest, 60.23% household affiliated with Farmers Organizations followed by Patna (38.9%) and Munger (28.9%).

#### **Awareness about ATMA institutions**

Since ATMA was a new concept for the research scientists, extension functionaries as well as well as mass farmers, it took long time in generating adequate awareness, especially among farmers. In view of utmost pertinence of such awareness, the impact study attempted to ascertain the level of awareness about ATMA and its different constituents. Awareness level of farmers was classified into 5 categories, viz. good, fair, average, poor and nil. On the basis of awareness level, farmers were regrouped into aware and not aware. While aware includes the farmers having good, fair or average awareness about ATMA institution, while the not aware group comprises of those farmers who were either unaware or had only poor knowledge of such institutions. The

percentage of farmers of NATP districts aware about ATMA institutions is given in the following Table-3.

**Table-3: Farmers in NATP districts aware about different ATMA institutions (in %)**

Districts	ATMA	ATMA Governing Board	ATMA Management Committee	Block Technology Team	Farmers Advisory Committee
Patna	99	44	41	74	75
Munger	100	10	6	69	64
Madhubani	99	37	38	70	76
Overall	99.33	30.33	28.33	71	71.67

The information presented in the above table reveals that majority of sample farmers of NATP districts were aware about Agricultural Technology Management Agency as such, BTT and FAC. However, lesser farmers were aware about the ATMA GB and AMC. The observed pattern appears obvious because the emphasis was laid on popularization of ATMA concept as well as its block level operational mechanism of which BTT and FAC were the key constitutions. There was some spill over effect on the farmers of non-NATP districts where a few of the farmers were aware about ATMA.

#### **Farmers-Research-Extension Linkage**

Improving research-extension linkage was another major objective of the NATP. To attain these objects, number of steps was taken in addition to in built institutional and operational mechanism. The AGB, AMC and BTT provided robust mechanism for regular interface among research scientist, extension functionaries and farmers. In addition, joint workshop and training programme were organized; moreover, scientist and extension officers were sensitized to regularly interact with farmers in order to obtain their feedback on research and extension activities. The study attempted to assess the two-way linkage between farmers and extension officers of different levels and between farmers and scientists. The two-way interaction between farmers and extension officers and between farmers and research scientists of KVK, SAU and ZRS increased during the NATP period.

**Table-4: Percentage Interface between farmers and researchers and extensions**

Particulars	NATP districts			Non-NATP districts		
	Baseline	Current	Change	Baseline	Current	Change
<b>A. Farmers visiting: different extension officers and scientists</b>						
Village Extension Workers	10.28	28.72	18.44	6.81	12.12	5.31
Block level line department Officers	13.82	50.35	36.53	1.51	10.61	9.1
District level line department officers	3.90	26.95	23.05	0	9.09	9.09

NGO	0.00	6.38	6.38	0	0	0
Extension staff of agri-business firms.	11.70	29.43	17.73	2.27	36.36	34.09
Scientists of KVK/SAU/ZRS	10.28	31.20	20.92	2.27	3.78	1.51
<b>B. Extension officers and scientists visiting farmers</b>						
Village Extension Workers	8.10	31.56	23.46	3.03	8.33	5.30
Block level line department Officers	12.05	51.06	39.01	0.75	3.03	2.28
District level line department officers.	3.50	30.14	27.64	0	2.27	2.27
NGO	0	7.09	7.09	0	0	0
Extension Staff of agribusiness firms	1.77	26.95	25.18	1.51	6.06	4.55
Scientist of KVK/SAU/ZRS	5.31	23.04	17.73	0	1.51	1.51

ATMA Governing Board and Management Committee provided common platforms for regular and face-to-face interaction among scientists, extension functionaries, and farmers. On the one hand, it improved awareness level of farmers and on the other, scientists' and extension personnel's understands of farmers' needs and problems. Some of the steps taken by ATMA for improving such linkages include organization of joint workshops, meetings and training programs. A few examples of such interventions are given in Table-5.

**Table-5: A few interventions for improving researcher-farmer extension linkage**

<b>Selected Interventions</b>	<b>Districts</b>
Appointment of researchers as Project Directors and Deputy Project Directors	Patna, Madhubani
Nomination of Project Director as member on Scientific Advisory Committees of KVK and extension education council of SAU	All NATP districts
Linkages with KVK and ZRS.	All NATP districts
ATMA developed linkages with Farmers Advisory Services of the SAU.	All NATP districts
Joint activities of research and extension included on-farm trials, workshops and trainings, exposure visits to research stations, and interface with the scientists.	All NATP districts

The ATMA-NATP substantially contributed in strengthening the R-E-F linkage. Extension system could put demands on research system and received feedback/solutions from them. Farmers also found their due place in this link-chain through representation in GB and AMC. Moreover, FAC has provided them an access to linkage mechanism through which they could articulate their problems and influenced research and extension priorities. However, in spite of the fact that farmers' feedback somehow reached to the

research and extension system but this mechanism and loop is yet to take permanent shape, as FAC is yet to attain the desired institutional status. The process has started taking place in the NATP districts. Research system has become more and more demand-driven. Instead of issuing blanket recommendations on the identified problems (as expressed by the farmers) system carried out various adaptive trials and issued recommendations on those location-specific priority identified in the SREP. The adaptive research conducted so far was successful in providing solutions to many farming system related problems of the farmers.

### **Diversification of farming system**

In ATMA's field program activities, the major emphasis was laid on diversification of the farming system as a strategy for risk management and sustainable income for the farmers. Farmers were motivated and trained through trainings, exposure visits to successful sites within and out of state and suitable demonstrations on the latest technology and practices. Table XI a reveals that existing farming systems were diversified by inclusion of animal husbandry/dairying, horticulture, fisheries, goat rearing, poultry and bee keeping.

**Table-6: Inclusion of new enterprises in the farming system**

New enterprise	NATP Districts			Non-NATP Districts		
	Patna	Madhubani	Munger	Nalanda	Darbhanga	Banka
Dairy/animal husbandry	25.00	10.8	32	2.20	17.80	0
Vegetable cultivation	8.69	10.8	25.8	28.90	0	0
Horticulture	3.26	Nil	1	Nil	Nil	Nil
Fisheries/duckery	Nil	7.5	1	Nil	Nil	Nil
Pig/goat/sheep rearing	Nil	Nil	Nil	Nil	Nil	Nil
Poultry	Nil	Nil	Nil	Nil	Nil	Nil
Bee keeping	2.17	4.30	Nil	Nil	Nil	Nil
Vermi Compost	4.34	Nil	1	Nil	Nil	Nil
Management of Nursery Farm	5.43	Nil	1	Nil	Nil	Nil
Aromatic & medicinal plants	8.69	Nil	Nil	Nil	Nil	Nil
Floriculture	3.26	Nil	Nil	Nil	Nil	Nil
Exotic vegetables	2.17	Nil	Nil	Nil	Nil	Nil

Figures in % of adopting farmers

Such a high level of change is attributed mainly to shift in the area under food crops to horticulture crops due to introduction of medicinal & aromatic plants cultivation, vegetable farming, floriculture and vermicomposting by large number of farmers. Diversification initiatives yielded very positive results in Patna and Madhubani districts. For example, about 33.67 percent farmers in Patna started taking horticulture activities.

In Madhubani, the major change consists of horticulture and dairy along with fish farming by farmers.

### Adoption of New Technologies / Practices

The NATP put ample efforts in promoting sustainability-enhancing and environment friendly technologies as well as latest improved farm practices. Some of these include integrated pest management, integrated nutrient management, intercropping, mixed cropping, organic farming, green manuring, seed treatment, line sowing, summer ploughing, drip/sprinkler irrigation, vermicompost use, zero tillage, bio-fertilizers, Poly house technology, etc. A number of training programs and exposure visits for farmers were conducted through ATMA initiatives to promote these technologies/practices. IPM/INM practices have quite wide acceptability among farmers in the NATP Districts. Zero tillage has become quite popular in Munger and Patna and has been accepted by farmers as a measure for sustainability and cost reduction.

**Table-7: Farmers adopting improved technologies (as % of targeted farmers)**

Improved Technological Practices	NATP Districts			Non-NATP Districts		
	Patna	Madhubani	Munger	Nalanda	Darbhangga	Banka
Vegetable production	21.7	25.8	40.2	13.3	Nil	Nil
Paddy Production	17.4	20.4	13.4	Nil	Nil	Nil
Wheat production	Nil	6.5	Nil	Nil	Nil	Nil
Pulses production	Nil	Nil	3.1	Nil	Nil	Nil
Use of green manure	10.9	Nil	Nil	Nil	Nil	Nil
Use of Zero tillage	8.7	Nil	11.3	Nil	Nil	Nil
Adoption of HYV	8.7	Nil	Nil	Nil	Nil	Nil
Use of FYM	6.5	Nil	Nil	Nil	Nil	Nil
Fertilizer and pesticide use	4.3	Nil	Nil	Nil	Nil	Nil
Use of green manure	Nil	Nil	11.3	Nil	Nil	Nil
Use of HYV	Nil	Nil	8.2	Nil	Nil	Nil
IPM in paddy	2.3	Nil	Nil	Nil	Nil	Nil
IPM in other crops	Nil	2.2	Nil	Nil	Nil	Nil
Disease Control	Nil	3.2	Nil	Nil	Nil	Nil
Mentha cultivation	3.3	Nil	Nil	Nil	Nil	Nil
Moong cultivation	Nil	Nil	Nil	8.9	Nil	Nil
Onion cultivation	Nil	Nil	Nil	11.1	Nil	Nil
Oilseed farming	Nil	Nil	Nil	2.2	Nil	Nil
Fruit Production	Nil	5.4	2.1	Nil	Nil	Nil
Nursery raising for fruits	Nil	Nil	1	Nil	Nil	Nil
Fodder Cultivation	Nil	1.1	1	Nil	Nil	Nil
Fish Production	Nil	1.1	Nil	Nil	Nil	Nil
Dairy farming	Nil	1.1	Nil	Nil	Nil	Nil
Potato Maize Intercropping	Nil	1.1	Nil	Nil	Nil	Nil
Makhana Production	Nil	1.1	Nil	Nil	Nil	Nil
Sunflower Farming	Nil	1.1	Nil	Nil	Nil	Nil

### Adoption by farm size class

As mentioned earlier, ATMA's carried out diverse field program activities including farmers' training, exposure visits and demonstration on varied subjects/ topics. The impact assessment study has assessed the adoption ratio for various technologies/practices propagated through trainings, exposure visits and demonstrations. Table 10 indicates that about 65.55 % of the farmers adopted various technologies and practices propagated through these training programs. The adoption ratio was observed to be the highest among marginal farmers (70.83%) followed by large and small farmers (65.92% & 59.88% respectively). In Munger and Patna all the farmers contacted through this study had received some kind of training (100%), while in Madhubani the figure was 84.94% of the sample (Table-8).

**Table-8: Adoption ratio of various training programs/ exposure visits by NATP in different Districts**

Adoption ratio of various training programs and farm practices				
Districts	Marginal farmers	Small farmers	Large farmers	Overall
Patna	59.96	66.02	60.86	62.28
Munger	63.32	50.60	55.64	56.52
Madhubani	89.33	63.02	81.28	77.87
Overall	70.83	59.88	65.92	65.55
Adoption ratio of technologies / farm practices through exposure visits				
Patna	66.6	16.67	50	44.42
Munger	12.5	6.25	4.75	7.83
Madhubani	46.66	60.30	61.42	56.12
Overall	41.92	27.74	38.72	36.12

[Figures in adopting farmers as % of farmers targeted]

In addition to training programmes, exposure visits were also organized for the interested farmers. During such exposure visits farmers could learn new enterprises and farm practices. In general around 36% of the farmers adopted new farm practices and new enterprises. However, 44% of the resource-poor farmers (Marginal) could get more benefit from such exposure visits than the resource-rich farmers (38.72%). (Table XIVb).

### Demonstrations

Various demonstrations were organized by the NATP to familiarize the farmers about the new techniques and practices. Table XIVc indicates that it was very effective and about 11% farmers adopted the techniques demonstrated by the NATP authorities. However, across the states there was a sharp difference in the adoption of these demonstrations by different categories of the farmers. These demonstrations could encourage the poor small farmers in adopting the new techniques and practices demonstrated by NATP authorities. This shows that this demonstration by the NATP was equally beneficial in promoting the adoption by the small farmers (Table-9).

It can be said that adoption of various improved techniques and farm practices (received

through training, demonstration and exposure visits) was quite effective in transfer of new technologies. They all had synergetic effect and jointly contributed in the adoption of new practices and improved technologies. Highest adoption ratio was observed in Madhubani followed by Munger. Adoption level among large farmers was generally higher than that among Marginal and small farmers.

**Table-9: Adoption ratio of various techniques and practices demonstrated by NATP in different states**

	Marginal farmers	Small farmers	Large farmers	Overall
Adoption ratio of various techniques and practices through demonstration				
Patna	0	0	0	0
Munger	0	0	20	6.67
Madhubani	0	50	33.3	27.76
Overall	0	16.67	17.76	11.47
Adoption ratio of field programs by ATMA under NATP				
Patna	42.18	27.56	36.95	35.56
Munger	25.27	18.95	26.79	23.67
Madhubani	45.33	57.77	58.66	53.91
Overall	37.59	34.76	40.80	37.71

[Figures in adopting farmers as % of targeted farmers]

However, in Madhubani, farmers of all the categories fully adopted what they learned through training programs, exposure visits and demonstrations. Similarly, adoption level was very high in Patna also irrespective of farmers' category. Overall, adoption level was very encouraging. Such a high level of adoption is attributed to identification and selection of only interested farmers for training, exposure visits and demonstrations. Active involvement of farmers' advisory committees and farmers' organizations in nomination of farmers for training programs, etc played an important role in this exercise (Table-9). This can be attributed to the fact that the farmer in general have a poor resource base as a result there risk bearing ability is also quite low. The farmers across different size groups are reluctant adopters they adopt new technology only after they are perfectly sure of its success and when they have seen the success through their own eyes.

### **Crop yield**

The adoption of various improved technologies and farm practices has resulted into yield enhancement in both NATP and non-NATP districts. However, increase in the yield was higher in the NATP districts due to several interventions made by the NATP. Average yield of some of the important crops are given in Table-10.

**Table-10: Change in the Yield of some important crops in different Districts**

Crop	NATP districts			Non-NATP districts		
	Baseline (qt/ha)	Current (qt/ha)	Gain (qt/ha)	Baseline (qt/ha)	Current (qt/ha)	Gain (qt/ha)
Paddy	31.05	33.65	2.60	35.53	36.26	0.73
Wheat	29.99	32.10	2.11	30.01	27.09	(-)2.92
Maize	56.82	56.00	(-) 0.82	48.23	48.80	0.57
Potato	172.40	175.22	2.82	195.90	184.83	(-)11.07
Tori	9.55	9.99	0.44	4.35	9.00	4.65
Onion	190.40	205.70	15.30	123.30	157.16	33.86
Yellow sarson	13.43	14.43	1.00	8.50	8.96	0.46
Lentil	11.45	11.71	0.26	10.90	10.22	(-)0.68
Gram	11.21	9.64	(-)1.57	10.56	8.89	(-)1.67
Lathyrus	10.8	12.40	1.60	Nil	Nil	Nil
Brinjal	222.44	214.34	(-)8.10	Nil	Nil	Nil
Cauliflower	199.40	202.46	3.06	Nil	Nil	Nil
Bhindi	101.12	140.65	39.45	Nil	Nil	Nil
Moong	11.09	11.46	0.37	5.55	10.41	4.86
Sugarcane	576.55	500.00	(-)76.55	Nil	Nil	Nil
Arhar	15.60	13.84	(-)1.76	Nil	Nil	Nil

**Total Household income**

Diversified farming system, adoption of improved farming technologies/practices and increased crop yield resulted into the increase of income from various sources. Average per household total annual income of sample households in the NATP districts is given in Table-11. On an average, per household annual income in the initial period was relatively high i.e. Rs.93541.66 in the non-NATP districts compared to the NATP districts (Rs.89049.33).

**Table-11: Per Household annual total income (in rupees) of sample households**

District	NATP districts			Non-NATP districts		
	Baseline	Current	Net gain	Baseline	Current	Net gain
Patna	99462	107312	7850 (7.89)	117763	124299	6536 (5.55)
Munger	111223	116602	5379 (4.83)	118230	121535	3305 (2.79)
Madhubani	56463	74355	17892 (31.68)	44632	55096	10464 (23.44)
Overall	89049.33	99423	10373.66 (11.64)	93541.66	85331	6768.33 (7.23)

Figures in brackets indicate percentage increase in the income over the NATP period.

On an average the income of a household increased by more than 11 per cent in the NATP districts as compared to 7.23 per cent in the non-NATP districts. The incremental income owes to rise in crop yield as well as shift in cropping pattern towards high value crops. This clearly shows that the strengthening/ improvement in the process of existing extension system were able to reduce the adoption lag and people could diversify their income sources. However, the increase in the income was higher in those districts, which

were highly developed and base income was already quite high. However, farmers in non NATP districts also experienced overall 7 percent increase in the household income.

### **Contribution of Agriculture in Total Income**

It is also to be noted that agriculture, including horticulture, animal husbandry, crops, sericulture, and fisheries was the major contributor of income and accounted for more than 3/4th of the total household income. Contribution of agriculture in total household income was more than 54 percent in the NATP and non NATP district. Non-agriculture sources like trade, wages, salary, etc. also contributed substantially to the net increase in income (Table-12). This was mainly due to adoption of diversification strategy and following of farming system approach. Anyhow, major focus of the NATP was on crop centered technologies but resource centered technologies also were adopted at many places and hence sustainability was assured.

**Table-12: Contribution of agriculture in total income (as % to Total Income)**

	NATP districts		Non-NATP districts	
	Baseline	Current	Baseline	Current
Patna	46.32	44.81	32.16	31.63
Madhubani	60.98	64.92	65.09	66.32
Munger	52.17	52.59	67.62	66.67
Overall	53.15	54.10	54.95	54.87

### **Conclusions**

The results clearly demonstrate that there has been improvement in the extension system and farmers have taken keen initiatives in the development process leading to their empowerment. Earlier disjointed extension system has taken the shape of integrated system and many new enterprises have been included in the farming system. During the NATP period ATMA have been able to generate some financial resources and develop infrastructure to facilitate trainings. The role of information technology was also realized by the NATP and at many places good infrastructure has been created and the relevant information was provided to the farmers.

The farmers' response was found to be quite encouraging. However, the relevant information relating to the improved technologies and farm practices need to be provided in local languages for easy dissemination of knowledge. Information per se is necessary but efforts have to be made to convert them into enhancement of knowledge base of the farmers.

For the first time a very systematic effort was made to identify the major constraints and research gaps. Scientists have become more responsive to the needs of the farmers and have sharpened their focus of research to meet the location-specific requirement of the farmers of different size groups. The need-based training and exposure visits to the farmers and farmer-led extension have played a very effective tool for the technology dissemination. There has been considerable improvement in the adoption of new

technologies and farm practices by all the categories of the farmers and the time lag in adoption has considerably reduced from 4-5 years to 1-2 years.

It is to be noted that the NATP was not started in all the districts at the same time. Hence, all the districts did not get same time to demonstrate their performance equally. Madhubani started functioning early in the second phase and performed well. Various interventions made by the NATP for improving and strengthening the process could substantially increase the income of farmers in the NATP districts and almost all sections of the farmers benefited. The spill over effect of these interventions was seen in the nearby districts also.

Overall, it can be concluded that the pilot testing of this experiment shows quite encouraging results and should be started in the whole state. A few of the states, where this NATP was implemented on pilot-testing basis, have already started thinking on these lines and also a few of the other states have started thinking to implement this NATP on a larger scale in the whole state. However, this NATP intervention requires some more time to make them fully operational, especially in the new districts. The results of this NATP indicate that this indigenously developed concept of innovative transfer of technology in an integrated manner can be adopted in the state and national policy and implemented with full governmental support in the same format.

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