Reorienting Land Use Strategies for Socio-economic Development in Uttar Pradesh

ARUN CHATURVEDI, N G PATIL, S N GOSWAMI

While the per capita availability of agricultural land has been decreasing rapidly everywhere in India, this article points out the socio-economic implications of current land use and management strategies in Uttar Pradesh. It argues that a judicious land use policy in synergy with the physical, economic and institutional factors should be framed, even as investment is encouraged in non-agricultural sector for employment.

Arun Chaturvedi (*arunchat55@gmail.com*), N G Patil (*nitpat03@yahoo.co.uk*) and S N Goswami (*goswami345@gmail.com*) are with the National Bureau of Soil Survey and Land Use Planning, Nagpur.

The land use pattern of any region/country at any point of time is governed by the prevailing physical, economic and institutional framework. The interaction of these parameters keeps the land use system dynamic in the long term, but stable in the short term. In other words, the land use pattern in India keeps evolving as the result of action and interaction of various factors such as physical characteristics (productivity, location, geography, etc) of land, the institutional framework (social, legal, etc) and the availability of resources (water, capital, labour, etc). As the economy is growing, the demand for land for purposes other than agriculture is continuously increasing. Though the numbers are not available, it is believed that land costs are almost doubling every three years in big cities and even rural hinterlands have witnessed a close to 100% hike during the last five years. The economic reforms in the last two decades have left the land sector untouched and there is a growing perception that land policy must be scrutinised for the next level of economic growth. India occupies only 2.4% of world's geographical area but supports more than 16% of the world population. The grazing area is limited to 0.5% of the world grazing area and yet 18% of the animal population lives in India. The point is further highlighted by the fact that the hot arid Indian desert (Thar) is the most densely populated desert in the world. Therefore, increasing pressure on natural resources is a major challenge confronting policymakers.

From the agricultural perspective, soil, water and weather are the most crucial natural resources for sustaining productivity levels and enhancing production to cope with the population pressure. In fact, it is all the more necessary in the case of land and water as they are so intricately related that one without the other loses its agro-productive utility. The productivity of agricultural land is directly linked to water use management. It must be also noted that approximately 56 billion Indians struggle for two meals a day. Indo-Gangetic plains have supported the largest chunk of the Indian population for centuries. The same region is however home to the world's most dense and destitute population. The natural resources in this region are depleting but optimum development and utilisation of natural resources offers a potentially enormous means of poverty reduction (Srivastava et al 2002). Thus, it is a delicate balancing between the conflicting interests of preserving and maintaining the natural resources while utilising them for development. The people who are causing land degradation and at the same time are the ones most affected by its consequences are the poor and marginal farmers, cultivating marginal lands. It is also true that they have none or very limited access to the decision-making process, no political power and most of their actions are not based on greed but on the need to survive.

1 Uttar Pradesh: A Representative Case

Land use in the country has acquired new dimensions with economic development. The hectic infrastructural development like roads, industries, increased residential space requirement as the affordability increases, changing lifestyles, etc, are now competing with agricultural usage of land. The socio-economic factors, and corporate and public interests drive economic activity on land and the resultant pulls, emerging trends have caused all concerned to take note of consequences for the society not only at the regional level, but also for the world because of the environmental effects. Uttar Pradesh (UP) is discussed here as a representative case. It is the most populous state in the country accounting for 16.4% of the country's population and covering 9% of the country's geographical area, encompassing 29.44 million ha. The density of population in the state is 473 persons per sq km as

against 274 for the country. As per the 10th state development plan, the population of the state is projected to be 306 million by 2050. The production of foodgrains to the tune of 94 million tonnes (mt) will be required to feed this population. The gross cropped area (GCA) will increase to 31 million hectares (ha) from the present level of 25.4 million ha of which gross irrigated area will be around 27 million ha and rainfed agriculture area is estimated to be 4 million ha. Thus, agricultural productivity will have to be more than doubled from the current 2 tonnes/hectare (t/ha) to 4.5 t/ha for irrigated and 0.6 t/ha to 1.5 t/ha for rainfed area. Alternatively, the gross irrigated area will have to be increased from current 19.21 million ha to 26 million ha by 2050 (World Bank Report 2002).

As per the UP government estimates (official website of state government), the per capita income of the state is Rs 4,787 which is one of the lowest in the country. Social development indicators like medical facilities, the teacher-pupil ratio in primary schools, birth, death and infant mortality rates, literacy, electrification of villages, per capita power consumption, etc, show that the state stands at 13 or 14 amongst the 16 major states. Being a predominantly agrarian economy, a look at the status of land use (Table 1) provides an important insight into the development potential of the state.

Table 1: Land Use in Uttar Pradesh

Land Use	Area in '000 Ha	Percentage
Total geographical area	29,441	
Forests	5,150	17.49
Not available for cultivation	3,516	11.94
Permanent pasture and grazing land	296	1.01
Land under miscelleneous tree crops and groves	513	1.74
Culturable wasteland	945	3.21
Fallow land other than current fallows	832	2.83
Current fallows	1,067	3.62
Net area sown	17,475	59.36

Source: http://envfor.nic.in/fsi/sfr99/chap3/up/uttar.html.

2 Salient Features of Land Use in Uttar Pradesh

Uttar Pradesh is cultivating about 58% of its geographical area, while the figure for the whole country is 45%. Out of the total geographical area of 328.02 m ha of India and 29.44 m ha of UP, 17.02 m ha and 13.58 m ha area suffer from various kinds of degradation, respectively. The per capita availability of agricultural land in India has decreased from 0.46 ha in 1951 to 0.11 ha in 2001 with the likelihood of a further decline in the near future. The situation of UP in this regard is poor. Due to increasing population pressure, the number of persons per hectare of the net cropped area also increased from about three in 1951 to five in 1990, which is estimated to further increase to about eight persons by the year 2025. Thus, the amount of land available for food supply and other human needs will continue to decline in per capita terms (Rathore and Pal 2000). A look at Figure 1 depicting population versus net sown area in the district (comparison of 2003-04 with base year 1993-94) shows that the net sown area has decreased considerably in many districts. Five of the 31 districts exhibiting a decline in net sown area, namely, Meerut, Moradabad, Banda, Bahraich and Allahabad show a greater decline. Eleven districts registered an increase in the net sown area (Figure 2) of which only Ballia showed a significant increase. All other districts remained almost stagnant. Net sown area has plateaued at 7.52×10^6 ha and no further increase can be expected. Figure 3 (p 171) outlines the net sown area per person in the state, an abysmal average of 0.1 ha. Thus, there are two clear facets – first to increase agricultural production without any horizontal expansion and second to minimise the decline in the net sown area, especially in fertile plains. Land use policy must consider these limitations for sustaining the population.

UP's economy is dominated by agriculture, which represents a 40% share of the state's gross domestic product (GDP) and 75% of its employment. According to a study by the Uttar Pradesh Council of Agricultural Research, UP contributes to 21.4% of foodgrains production from 16.5% of the area (1996-97). In respect of net sown and GCA, the state's share is 12.1% and 13.1%,

Figure 1: Net Sown Area of Districts Registering a Decline from 1993-94 to 2007-08 in UP

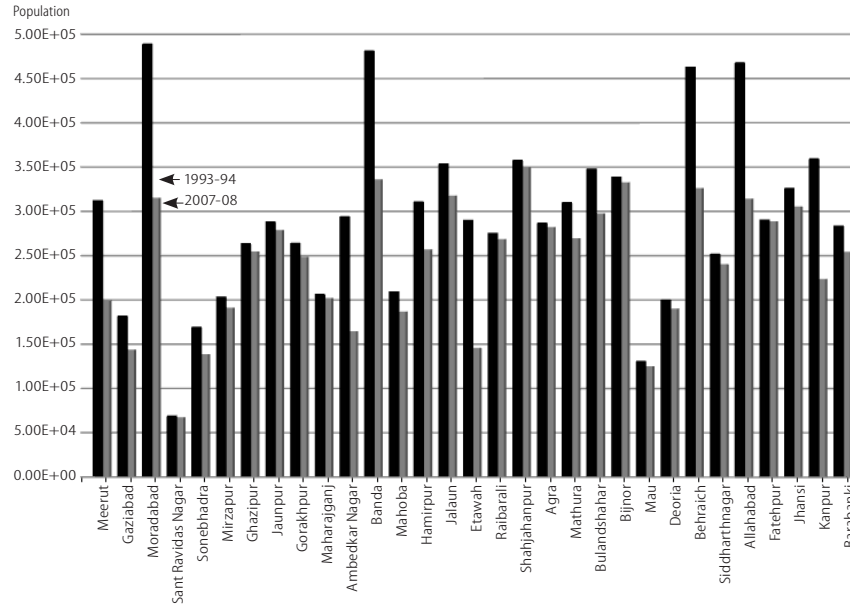


Figure 2: Net Sown Area of Districts Registering an Increase from 1993-94 to 2007-08 in UP

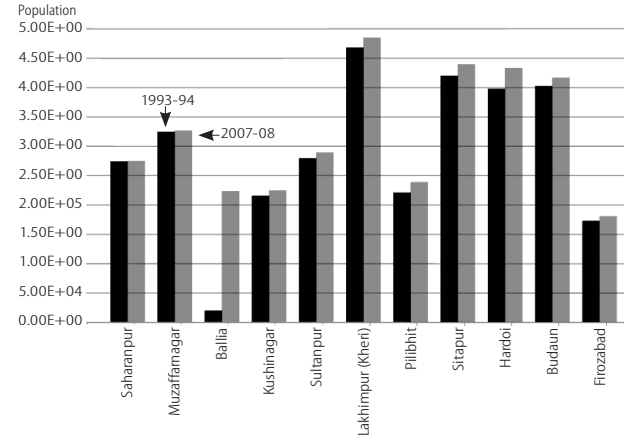
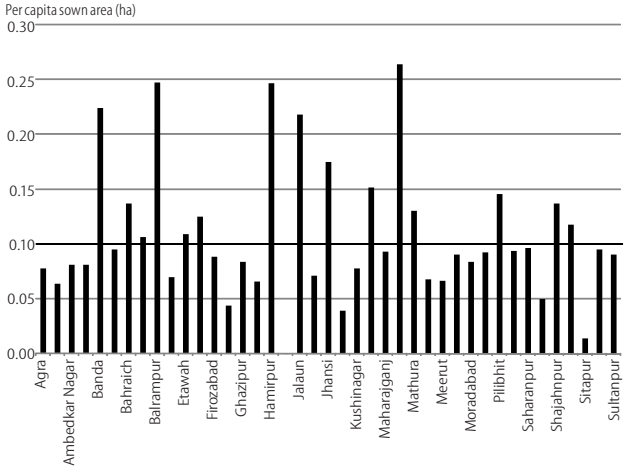


Figure 3: Per Capita Net Sown Area in Districts of UP



Sources for all data presented graphically is: http://updes.up.nic.in/spatrika.htm (official website of Government of Uttar Pradesh).

respectively (1995-96). In 2002-03, UP contributed 8.11 mt of wheat and 23.61 mt of rice which is 11.16% and 36.27% to the national production, respectively.

3 Size of Holdings

Various studies have brought out that wherever the soils are good, there is larger number of holdings of smaller size (Chaturvedi 2000). In the case of UP, smallholding and patta lands are economically non-viable to support the family, compelling owners to concentrate more on wage employment. Consequently, tiny holdings are often neglected (Rathore and Pal 2000).

According to Sivakumar (2001), less than half the rural labour households in the country have land, and of those who do, only about 13% of them own land over one hectare. An interstate comparison (Table 2) shows very disparate results. States, where over 50% of rural labour households own land include Madhya Pradesh, Orissa, Rajasthan and Uttar Pradesh. These are not very well-to-do states in terms of per capita incomes. On the other hand, the wealthier states of Punjab and Haryana have low proportions of rural labour households owning land – at 6% and 12%, respectively. However, a distribution among the landholders shows that inequality in distribution by size of landholding is pronounced in states like UP and Orissa, too. There is also a trend of the holding sizes declining during the last two decades, making the situation further grim.

Table 2: Distribution of Rural Labour Households by Average Size of Land Cultivated

State	% of Households by Size of Land in Hectares						
	0.01-0.20	0.21-0.40	0.41-0.60	0.61-0.80	0.81-1.00	1.01-2.00	2.01 and Above
MP	13.9	20.2	17.6	13.9	11.5	17.9	4.7
Maharashtra	13.9	14.6	12.5	12.9	9	28.3	8.4
Orissa	32	27.4	14.6	10.3	7.9	7.2	0.3
Rajasthan	9.7	22.3	18.8	13	10.7	12.3	12
UP	47.2	30.1	11.2	4.9	2.1	3.1	1
Punjab	22.2	34.7	4.8	14.8	9.8	8.9	4.3
Haryana	23.9	31.6	5.5	14.3	3.1	12.5	8.7

Source: Sivakumar (2001).

4 Land Reforms

As per the agricultural census 2005, 80% of landholdings in the state are less than 2 ha, but these farmers operated only 63% of the total operated area of 17.91 million ha. It could be inferred that 20% of the population holding greater than 2 ha operates 37% of the area, an obviously skewed distribution of operated area among the different classes of holding. Given the size of holdings and continuous fragmentation, it is safe to assume that the majority of the farmers will switch over to alternate occupations if presented with the opportunity.

State land use boards are rarely involved in actions related to change in land use. In many states, the boards have a perfunctory existence due to negligence. The institutions like the National Bureau of Soil Survey and Land Use Planning have a huge amount of data regarding soil characteristics that needs to be applied for evaluation of land use changes and proposed usage while formulating policies. The soil information is not utilised even in deciding fertiliser dosage/policy. For example, biased subsidy in favour of nitrogenous (N) fertilisers has adversely affected the balanced use of nutrients. In fact, the soil data indicates that N availability is adequate in most parts of the state.

Another parameter that would add to pressure on land resources is urbanisation. With diversion of population from agriculture to other sources, it would be pertinent that land requirement for housing will increase. According to an estimate (Table 3), the shortage of housing in the urban sector remained static during the last few years implying that in future the demand on land will be more as the economy grows. Incentives for apartment buildings housing many families in limited land space need to be offered in place of the current practice of 1:1 floor space index prevailing in most of the cities. A uniform policy for different class of cities depending on the type of land being lost has to be formulated. Fertile lands should not be readily permitted to be converted into non-agricultural usage.

Table 3: Urban Housing Shortages in India and UP
(1997-2001, million)

No	Year	India	UP	%
1	1997	7.57	0.88	11.6
2	1998	7.36	0.86	11.7
3	1999	7.18	0.84	11.7
4	2000	6.93	0.81	11.7
5	2001	6.64	0.77	11.6

Source: Compendium of Environment Statistics, Anonymous (2001).

Since 1950-51, the area under culturable wastelands in the country as well as in UP has been declining consistently. As far current fallow is concerned, the area both in India and UP has increased during the post "green revolution" period.

According to a study on fallow and culturable wastelands in UP, about 84% of farmers have some part of their land as underutilised which is about 29% of the total owned land. The state has about 2 million ha of current and other fallow, which needs to be utilised for productive purposes (Rathore and Pal 2000).

Irrigation development in the last two decades has caused a shift of cropping pattern in UP in favour of wheat and rice. The relative share of pulses was about 11% in the triennium (TE) 1999-2000. Chick pea (gram) and pigeon pea (tur) occupied about 44% of the total pulse area in the same period. Their relative share in total pulse area was as high as 70% in the TE 1982-83. Largely, lentil, green gram, black gram and pea substituted these two pulses. With the rapid irrigation development in the state, chick pea area shrank gradually. Availability of short duration varieties like lentil, pea, green gram and black gram facilitated the rapid adoption in diverse environment. The area under oil seeds went up by 40% during TE 1982-83 to TE 1999-2000. Based on agro-climate

Table 4: Prospective Area for Agricultural Diversification

Regions	Cereals	Pulses	Oilseeds	Sugar Cane	Vegetables	Livestock
Western	-	+	+	+++	+++	+++
Central	+	++	++	+	++	++
Eastern	++	+	+	+	-	+
Bundelkhand	-	+	+++	-	+	+

+ Marginal emphasis, ++ Moderate emphasis, +++ High emphasis, - Reduce emphasis.
Source: Authors' exercise.

suitability and soil resources, the agricultural diversification that is suggested (Table 4) underlines the need for reorganisation of cropping preferences/planning.

5 Other Resources: Problems and Potential

The Indo-Gangetic alluvial plains are among the most extensive fluvial plains in the world and extend to several states of northern, central and eastern parts of India. These are, however, not uniform in nature and the soils developed in alluvium exist in differing climates and landforms, ranging from arid to sub-humid and elevations of 150 m above the mean sea level (MSL) in the Bengal plain and 300 m above MSL in Punjab plains with local variations in geomorphology deciding the soil type (Velayutham et al 2002). The major part of UP (nearly two-thirds) is covered by what are popularly known as alluvial soils, with the level of alkalinity being a crucial factor in their utilisation. The central-western part of UP is also severely affected by problems of salinity and sodicity, the penalty being paid for irrational use of water for indiscriminate irrigation, though these were the areas which flourished during the green revolution.

The state has a large variety of soils (NBSS 1997) and problems associated with their utilisation. A growing concern in the state is the declining productivity of foodgrains, especially rice and wheat, which is mainly due to water-induced land degradation such as sodification, groundwater depletion and loss of soil fertility. Sodification, especially in poorly managed irrigated areas, has left an estimated 1.25 million ha of land completely barren. A further 1.25 million ha of low-yielding salt-affected lands cover about 10% of the net cultivated area of Uttar Pradesh. The worst affected areas include the eastern regions and to some extent the central regions of the state.

When the land becomes sodic, it is too salty to farm. The weather of UP, which alternates between heavy monsoons and prolonged dry periods, makes sodification worse. Where drainage is blocked, naturally, or due to human activities, surface water accumulates and evaporates, leaving sodium ions from the salts to form an electrochemical bond with clay particles in the soils, creating toxic salts.

Since 1945, the central and state governments have launched many reclamation programmes, but the results have been uneven due to limited institutional coordination, inadequate understanding of the total technology package and a top-down approach that gave little encouragement to beneficiary participation. Large areas under village common lands in the state are affected by sodicity. Afforestation of these soils is possible. Technologies and tree species have been identified by researchers. A part of these lands may be leased to the corporate sector for afforestation. Such an attempt would attract revenue for the villages besides generating employment opportunities for landless labourers, improving the sustainability of the natural resources and enhancing the quality of the micro-climate. Earlier efforts included the allotment of cultivable salt-affected land

to landless labourers, who were largely unable to bring the lands back to full production. The major constraints in implementation of land development schemes are related to: (a) absence of ownership by the user communities, and (b) lack of coordination among various agencies.

Water Resources: As per the 10th state plan document, domestic water demand for UP by 2050 will be 21.03 billion cubic metres (BCM)/year, and the demand for consumptive use of power will be 7.7 BCM/year. Industrial water requirement will be 8.1 BCM/year and irrigation water requirement will be 147.6 BCM/year. At this rate total withdrawal demand is estimated to be 185.31 BCM/year against the estimated total availability of 188.30 BCM/year. It is obvious that water use must be judicial. The state has created irrigation potential of 8781.35 x 10^3 ha till the end of the Tenth Plan, of which 6926 × 10^3 is reported to be utilised. Utilisation of water resources in the state remains poor as indicated by the poor water use efficiency (40% to 60%) observed across all major- and medium-irrigation projects. The maintenance of existing irrigation networks can be handed over to the private sector while keeping the reservoir with the state. Such a reform will also reduce state expenses. Water use associations need to be encouraged further by providing incentives in competition with the private sector. The state ranks seventh among eight major states where micro-irrigation has been adopted. The financial outlay for encouraging micro-irrigation was poor (Rs 1,205 lakh in 2006-07) and needs to be increased substantially.

Waterlogging in canal irrigated areas especially in eastern UP, is posing a serious threat to agricultural production of the state. Of the water logged area of 8.5 million ha in the country, about 25% is in UP. The annual loss due to waterlogging is estimated at 1 tonne/ha. The main reasons for rising water tables are: (1) conveyance losses from canal network, (2) inefficient on farm water management, (3) lack of natural drainage, (4) upheaval in the river bed, (5) indiscriminate cultivation in the beds of drainage channels, (6) impaired natural drainage due to the construction of roads, embankment, etc, (7) discharge of surplus canal water into channels with inadequate capacity, and (8) non-utilisation of groundwater (Bhargava and Abrol 1990). Installation of shallow tube well will act as a vertical drainage as well as a source of irrigation. Incentives may be given to farmers for installing tube wells and using groundwater for irrigation.

Excessive use of groundwater is adversely affecting the groundwater table, especially in western UP. A high intensity of tube well irrigation due to area expansion in favour of rice and sugar cane was the principal reason for a steep decline of the water table. Introduction of diversification of agriculture towards low water requirement crops and withdrawal of subsidies on power may control the fall in the water table. Conjunctive use of surface and groundwater will control the falling water table.

6 Other Facets of Socio-economic Deprivation and Land Use

The poor remain poor as they are unable to utilise their land resource to the optimum. There is always a dearth of money for investing in fertilisers, pesticides and all the ingredients required for modern agriculture. And because there is no investment, productivity remains poor completing the cycle. There is no doubt that poor people with poor information and technologies can never succeed in improving their lot on poor lands. If this vicious circle is to be broken at least one variable has to change.

Poverty can be evaluated along a number of dimensions – material deprivation, human deprivation, and a range of other deprivations – e g, lack of voice, vulnerability, destitution and social exclusion. UP unfortunately has the largest instance of *material deprivation,* relative to other Indian states, and progress in reducing poverty has been uneven over the past two decades. The vast majority of poor households live in rural areas (80%) and poverty historically has been concentrated in the eastern and southern regions of the state. Official estimates suggest a decline in poverty between 1983 and 1987-88, with progress diminishing through 1993-94 (World Bank 2002).

Given the scenario in UP, there is not much that can be achieved from whatever inherent positive attributes the soil and land resources may provide. As mentioned earlier, poor management of these resources leads to their deterioration ultimately degrading them for no use to the posterity. Even if billions of rupees are pumped in for efficient agriculture management, it is certain that only a few will be able to take advantage of the same and shall create further disenchantment among the rural poor. The emphasis has to be on creating opportunities for development of non-farm sector in the rural areas, in addition to creating more wage-earning opportunities in the medium towns that are so many in the state.

REFERENCES

Anonymous (2001): Report of the Technical Group (11th Five-Year Plan 2007-12) *On Estimation of Urban Housing Shortage*, Government of India, Ministry of Housing and Urban Poverty Alleviation, New Delhi. URL: http://mospi.gov.in/comenv 2000tab7.2.5.htm Ministry of Statistics and Programme Implementation, Govt of India.

Ashok Seth (1999): Press release of World Bank no. 99/1855/SAS URL:http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/0,,contentMDK:20016252~menuPK:64282138~pagePK:41367~piPK:279616~theSitePK:40941,00.html

Bhargava, C P and I P Abrol (1990): "Nature and Extent of Salinity and Waterlogging: Problems in India" in I P Abrol and V V Dhruba Narayana, Technologies for Watershed Development, Indian Council of Agricultural Research, New Delhi.

Chaturvedi, Arun (2000): "Spatial Analysis of Landholding Patterns in Different Soil Types" in Proceedings of 22nd Indian Geography Congress, held at Dharwad, 22, 24 December.

Jha, D (2000): "Agricultural Research and Small Farms", *Indian Journal of Agricultural Economics*, 56(1): 1-23.

NBSS (1997): "Soils of Uttar Pradesh for Optimising Land Use", NBSS publication 68B, National Bureau of Soil Survey & Land Use Planning, Nagpur.

Rathore, R S and U R Pal (2000): "Optimisation of Under Utilised Land – Future Perspective of Increasing Food Production" in International Conference on Managing Natural Resources for Sustainable Agricultural Production in the 21st Century held at New Delhi, 14-18 February.

Sivakumar, Sowmya (2001): "Proportion of Agricultural Labour Households on the Rise", *Economic Times*, Mumbai, 8 September.

Srivastava, S K, S Bandopadhyaya, H C Meena Rani, V S Hedge and V Jayaraman (2002): "Incidence of Poverty, Natural Resources Degradation and Economic Policies and Interventions: A Study Based on Wasteland Mapping", *IAPRS & SIS*, Vol 34, Part 7, Resources and Environmental Monitoring, NRSA, Hyderabad.

Velayutham M, D K Pal, T Bhattacharya and P Srivastava (2002): "Soils of the Indo-Gangetic Plains, India: The Historical Perspective", Y P Abrol, S Sangwan and M K Tiwari (ed.), *Land Use-Historical Perspectives: Focus on Indo-Gangetic Plains* (New Delhi: Allied Publishers).

World Bank (2002): URL: *Poverty in India – The Challenge of Uttar Pradesh*, World Bank Report – 8 May (1 of 4) http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2002/07/02/000094946_0206190400469/Rendered/PDF/multiopage.pdf