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Land Resource Policies and Agricultural Patterns - Indian Experiences[1]

M. H. Qureshi, New Delhi

Land is not a free gift of nature as believed by people earlier. It is an inextensible resource with finite supply, confined within the national boundaries of a country. It is impossible, in the modern times, to annex any territory or a piece of land by an act of aggression and retain it without creating an unredeemed disputed territory for perpetual political and social tension between the two neighbours. It is one of the most important factors of production and its ownership ensures economic prosperity and social status to the holder, not only in India but in some other societies as well. It is due to this reason that the farmers cherish its ownership rights obtained through inheritance or purchase. The village society in India is, historically, rooted in the land where farmer performs his most remunerative economic activities i.e. crop farming and animal husbandry. Land has also been a source of revenue for the exchequer of the State. The village during ancient period has been described as self sufficient unit where tillers of the land were owners and King had the power to increase or decrease the revenue.

The land settlement exercise had been carried out in India much earlier before the British colonization. It was Sher Shah who gave the responsibility of measuring the land and fixing land revenue to Todarmal who classified the land in four types according to the quality of soil and its cultivability in order to fix the revenue to be paid by the operators. These land types were: (i) Polaj, the best quality land, suitable for continuous cultivation without fallowing. (ii) Parati, the type of land that required fallowing in order to recoup the soil fertility through natural processes and the polaj rate of revenue was levied on this land during the year of cultivation (iii) Chachar, the type of land that required fallowing for longer time, extending three to four years, due to the low quality of soil and full revenue was realized on such lands after 3rd year. (iv) Banjar, the land with worst quality of soil, was usually kept uncultivated for 5 or more years. In order to encourage cultivation of this type of land full revenue was charged only the fifth year. After Akbar came to power, he included Raja Todarmal, in his durbar as one of his Navaratnas ('Nine Gems'). Akbar adopted the classification of land developed by Todarmal when he was with Sher Shah. Same crop rates, converted to cash, remained prevalent till the 10th year of Akbar's rein (1566). There was a need to develop standard measure of land to be able to charge the revenue in a scientific

1. The Presidential address delivered at the 37th Indian Geographers' Meet on 11th February 2016 at Kurukshetra University, Kurukshetra - Haryana.

manner. Todarmal developed the method of measuring land in a unit called 'Bigha' as standard unit of area for carrying out the land settlement in Akbar's empire. A 'Bigha' was (60x60 yards) i.e. 3600 square yards. The yard, according to Aine-Akbari was known as Gaz-e-Illahi, measured 41 angul (digits) or 33 inches in length. It means the Gaz-e- Illahi was shorter by three inches than the gaz (yard) during British period. The Bigha measured equal to almost half an acre. The revenue was fixed on the basis of the average production taken for the last ten years. This rule was known as Ain-e-dahsala (ten yearly rule).

The British colonial powers took over the revenue collection in Bengal and with shift of political power; the land became one of the major assets for them to extract revenue. The Permanent Settlement was thus, done in 1793 in Bengal and Bihar by Lord Cornwallis. Zamindari system was introduced under the aegis of Permanent Settlement and the revenue collectors were made Zamindars with the hereditary rights. The cultivators became mere tenants with no right of ownership on the land. They were always under uncertain tenurial conditions without any security and could be evicted at will. Zamindars were given the right to retain 1/11th part of the revenue collected from the peasants and 10/11th part was the share of the state. Thus, the system became exploitative as the Zamindars tried to extract as much revenue as they could to enhance the amount of their share. Later Orissa (Odisha), northern districts of Madras and Varanasi district were also brought under permanent settlement. About 19% of the area under British rule came under this land tenure system.

Ryotwari system was already there in India under the rule of Sher Shah Suri and later the Moghals also adopted it. The word has been derived from Arabic word rea iah and became ra'eyyat in Urdu which means peasant. Lord Thomas Munro retained this system of revenue collection and it was first introduced in Madras and adjoining states. Later, after Maharashtra was annexed in the British Empire, the system was extended to Bombay also. This system was prevalent in 51% area of the British Empire. There was no intermediary between the State and the farmers in this system unlike the Zamindari system. The cultivator was owner of the plot of land with the condition that they will be liable to pay taxes. It was not a permanent settlement and could be revised after 20-30 years when the demand of revenue was raised by the State.

A modified version of Zamindari system was introduced in North West Provinces, covering the fertile tract of Ganga Valley extending up to Awadh as well as including Haryana and Punjab and parts of Central India. This system was known as Mahalwari. It was introduced in 1822 and revised in 1833. About 30% of the British Empire was under this tenure system. Mahal was a compact area of a few villages or a district identified as unit for revenue collection. The English equivalent of a Mahal may be an "estate". The revenue was assessed on the whole Mahal and the person made responsible for its collection was Lambardar and each head of the household was responsible for the payment of revenue.

The British system of land revenue assessment and extraction was very exploitative accentuating the poverty level of the peasants. It was not only the land but

also the cropping pattern was controlled by the British and peasants had no freedom to cultivate the crop of their own choice. The introduction of indigo cultivation by the British planters started as a matter of policy of the then East India Company in1777. As the British power expanded, the peasants in Burdwan, Murshidabad, Bankura and Birbhum in Bengal were made to grow indigo, to be supplied to the textile mills of Liverpool and Manchester. The exploitation of peasants was so rampant that the protest started against the British policy, resulted in a peasant revolt in 1859. The discontent had been simmering for a long time. Gandhi ji also joined the movement against the British policy and became the part of the Champaran satyagrah in 1917. In 1918 Kheda (Gujarat) satyagrah was also launched by Gandhi ji. Champaran satyagrah was triggered by the increase in land rent, farmers being forced to grow indigo, with low wages, ruthlessness of colonial planters in dealing with the peasants who suffered from abject poverty. Thus, slowly, the freedom movement percolated amongst the farmers. The rural masses joined the agitation and became active participants in the freedom movement. It was not only the forced indigo cultivation which was introduced in Calcutta (Kolkata) hinterland that irked the peasants and once the indigo became useless after chemical dyes were invented; other crops were introduced and were forced on the peasants. Opium cultivation replaced indigo cultivation. Later, when opium trade with China ceased, Jute was introduced to replace opium. Cropping policies were changed by the British in view of their trade profitability, while peasants were not allowed to grow the subsistence crops such as rice etc. The planters always occupied the better quality land and less fertile land with low productivity was allocated to the peasants which, consequently, accentuated their level of poverty.

During the freedom movement 'land to the tiller" became a very powerful slogan and Congress party spearheading the movement attracted the peasants and ensured their participation in the movement. They were assured of permanent ownership of the land in order to get rid of being evicted at will by the zamindars. The land was concentrated in a few hands. Tenancy security was a major issue. After the independence, when the Constitution of India was adopted, provision for development of agriculture and animal husbandry was made as part of Directive Principles of State Policy. Article 48 of Directive Principles of State Policy in the Constitution of India under the caption, 'Organisation of Agriculture and Animal Husbandry' directs that "the State shall endeavour to organise agriculture and animal husbandry on modern and scientific lines and shall, take steps for preserving and improving the breeds, and prohibiting the slaughter of cows and calves and other milch and draught cattle". Agriculture has been the mainstay of the people of India and land and water have been the basic physical-environmental resources on which the farmers depended for the cycle of production in different agricultural seasons.

With low level of technology, animals, particularly the male bovines provided the main traction power for the ploughs as well as pulling water from the wells. This dependence on animals called for the protection and improvement in their breeds. The milk production for home consumption

as well as for sale became an auxiliary activity within agriculture.

India after independence faced severe food shortage and revived the "Grow More Food" campaign which was initially launched in mid 1940s to involve the farmers at the grass root level in the rural areas. Actually the expression, "Grow More Food" was taken from the Taitriya Upnishad where the commandment exists as, "Annam bahu kruveet, tad vratam"(grow more food, that is thy duty). Village self sufficiency in the production of food grains was also emphasised. But the campaign could not create enthusiasm and participation at the national level was poor and could not catch up as a mass movement for improving the village life. The village republics as envisaged by Gandhi ji could not be raised. The campaign could not become very popular at the grass root level and 'Grow More Food Campaign Enquiry Committee' was appointed in 1952. The Community Development programme emerged out of the recommendations of this committee and later Development Blocks were created to initiate the development works at the district level.

Land Reforms after Independence:

After the independence of the country, the most important task before the polity was to reform the institutional factors of agricultural production. The most important and revolutionary land policy was, perhaps, the removal of intermediaries between the State and individual cultivators by abolishing the Zamindari system. "Land-reform policy in India had two specific objectives: The first is to remove such impediments to increase in agricultural production as arise from the agrarian structure inherited from the past. The second object, which is closely related to the first, is to eliminate all elements of exploitation and social in-justice within the agrarian system, to provide security for the tiller of soil and assure equality of status and opportunity to all sections of the rural population." (Government of India 1961 as quoted by Appu 1996)

The Kumarappa Committee recommendations led to the enactment of a number of policy related legislations. There is no denying the fact that independent Indian farmers inherited feudal system in which land was concentrated with the Zamindars or the large holders. There was no security for the tenants. Since land has been a state subject, most of the states enacted laws to abolish Zamindari system and decided about the rate of compensation to be given to these Zamindars. The abolition of Zamindari and dispossession of large land holders gave an opportunity to correct the land distribution amongst the tillers and other landless segments of the population in the rural areas.

The ceiling on the land holdings was another measure adopted by the states to get the surplus land for distribution amongst the poor. There was visible disparity in the distribution of land as the supply of land was limited as against the demand for it. The State Governments faced the problem of distributing land amongst the landless. There were not many options. One peaceful option available to the governments was to create surplus land by limiting the size of land holdings by putting a ceiling on these. The states initiated the land ceiling by enacting laws in late fifties and early sixties. Jammu and Kashmir was the first state to enact land ceiling law followed by West Bengal, Himachal Pradesh and Maharashtra. The table below gives a glimpse of the ceilings

prescribed by some selected states. Dry land farming areas were given higher limit of land ceiling to compensate the limited choice of crops and low productivity. While the area with irrigation and two crops had the lowest land ceiling.

Table-1: Land Ceilings in Selected States (in hectares)

States	Irrigated with two crops	Irrigated with one crop	Dry land
Andhra Pradesh (incld.Telangana)	4.05 to 7.28	6.07 to 10.93	14.16 to 21.85
Assam	6.74	6.74	6.74
Bihar (including Jharkhand)	6.07 to 7.28	10.12	12.14 to 18.21
Gujarat	4.05 to 7.28	6.07 to 10.93	8.09 to 21.84
Haryana	7.25	10.90	21.80
Himachal Pradesh	4.05	6.07	12.14 to 28.33
Jammu and Kashmir	3.6 to 5.06	3.6 to 5.06	5.95 to 9.20 (7.7 in Ladakh)
Karnataka	4.05 to 8.10	10.12 to 12.14	21.85
Kerala	4.86 to 6.07	4.86 to 6.07	--
Madhya Pradesh (including Chattisgarh)	7.28	10.93	21.85
Maharashtra	7.28	10.93	21.85
Manipur	5.0	5.0	6.0
Odisha	4.05	6.07	12.4 to 18.21
Punjab	7.0	11.0	20.50
Rajasthan	7.20	10.93	21.85 to 70.82
Tamil Nadu	4.86	12.14	24.28
Tripura	4.0	4.0	12.0
Uttar Pradesh (including Uttarakhand	7.30	10.95	18.25
West Bengal	5.0	5.0	7.0

Source: https://www.indiaagronet.com

The normative criterion was adopted by respective states but implementation was largely flip flop. Firstly, there was a lobby of large farmers wielding a lot of political clout. Hence, the political will was lacking. Secondly the large farmers kept their surplus land as fallow to save it out of the purview of the ceiling. Thirdly, land was transferred by Benami transactions which the revenue administration either failed to locate or ignored.

The other route to correct the unequal land distribution and provide land to the poor was adopted in some areas where violent social conflicts were started to take away the land from big owners. The armed struggle

of Naxalbari and Telangana are matters of history. The ceiling on the land holdings was the measure adopted by the states to get the surplus land for the purpose of distribution amongst the deprived and avoid the social conflicts.

The ceiling on land holdings also aimed at eliminating the exploitative tenancy relations and removing the absentee landlordism. It was expected that the provision of land to poor by distributing the surplus land would generate more employment and higher production of food grains. While summarising the discussion on 'Agricultural Production Relations in the Context of the New Agricultural Technology' G.K Chadha (1995) reported that," the picture regarding leasing-in and leasing-out of land across the regions was highly disparate; that leasing-in and leasing-out was discernible all along the farm size continuum; that the phenomenon of reverse tenancy existed even in the pre-green revolution era and that it only got magnified after the arrival of the new farm technology; that, undoubtedly, the incidence of tenancy had considerably declined during the preceding three decades or so, yet contrary to the picture revealed by published reports ,including Agricultural Census and the National Sample Survey data concealed tenancy operates on a considerable scale whose magnitude and form varied from region to region". It seems that with all the policy interventions the question of tenancy did not die out in the agricultural sector in different regions of the country in spite of reported decline. The registration of tenants was absent except in West Bengal where they were registered under 'Bargadari System.'

Yet another initiative to get surplus land for distribution amongst the poor, which merits mention, is Bhoodan Movement initiated by one of the practicing Gandhians, Vinoba Bhave. Bhoodan can be termed as a voluntarily accepted land reform in which the landlords donated land for distribution amongst the poor and land less. After Mahatma Gandhi fell to the bullets of an assassin, Vinoba Bhave remained stunned for sometime analysing the fact whether violence was more powerful than non-violence. He left the Paunar Ashram to perform padyatra (travelling on foot) to study the ethos in the country. He reached Andhra Pradesh in April 1951 and camped in Pochampalli village of Nalgonda district. He wanted to test the efficacy of non-violence in the face of violent agitation. In fact he wanted to test whether Gandhian concept of non-violence can match the distribution of land by violence. The villagers gathered to hear his discourse in the evening. Members of forty Dalit families had also come to see him. The Dalits posed a question, whether he can get them 40 acres wet and 40 acres dry land from the government for the forty families so that they can cultivate it. It was a dilemma for Vinoba as he never had the mandate from the governments, whether Central or the State, to guarantee the distribution of land to the poor. He suggested that if the Government is not able to give land then shall the village landlords accommodate these families? One of the landlords of the village, Mr. Rama Chandra Reddy offered 100 acres of land to Vinoba so that these families can be given land for cultivation. This was the beginning of Bhoodan. Vinoba got the clue and started asking for land from the rich

for distributing it amongst the poor during his padyatra across the country. He had no political ambition as he was designated by Gandhi ji as his spiritual heir and had been selected him to be the first Satyagrahi in 1940. The Bhoodan was criticised and alleged that landlords in Telangana were afraid of the communist movement and were abandoning their land. Vinoba continued his Bhoodan movement in north India where there was no conflict. He was donated land in these areas also. This land was to be distributed amongst the poor of the villages but the major drawback was that land is only one factor of production. The poor farmers could not cultivate this small piece of land in absence of even a minimal infrastructure and tools such as plough, bullocks, seed and water. In most of the cases this land was usurped by the powerful in the village. It was an example of peaceful revolution whose philosophy was sound but implementation lacked commitment and revenue department failed to handle it properly.

The Population increase in the country has resulted in the decrease in the average size of operational land holdings in every decade as is evident from the following table.

Table 2 : Average size of land holdings during 1970-71 - 2010-211

Years	Average size of O.H. in hectare
1970-71	2.28
1980-81	1.84
1990-91	1.55
2000-01	1.33
2010-11	1.15

As a result the diminishing size of operational holdings, these are progressively becoming uneconomic. It is impossible to mechanise such small holdings. "Theoretically there is little justification for consolidation in the usual manner. But the number of holdings smaller than 1 ha, especially those smaller than 0.5 ha, have been increasing over the decades. This process causes concern. One successful approach has been taken by a few groups of small and marginal farmers in Karnataka and Maharashtra. These farmers came together to cultivate a particular crop (strawberries, tomatoes, gherkins or rose onions) on a contract basis with a price for the produce agreed in advance with the contractor. They could, therefore, overcome the viability threshold to cultivate such investment-intensive crops" (Deshpande, 2003). Thus, the intervention at the policy level is required to make the holding size viable.

Consolidation of fragmented landholdings was yet another reform to facilitate efficient operation of agricultural work by the farmers. The law of inheritance in India accepts the rights of siblings on the landed property of parents. The breaking of joint families entails the division of the land holdings which causes not only the reduction in its size but also its fragmentation. The plots become smaller and smaller when the divisions take place. Hence, consolidation of holdings became an integral part of the land reforms. Consolidation ensures an efficient agricultural operation and better supervision. It brings efficiency in agricultural operation by saving time as well as resource in reaching from one plot to the other. Maharashtra was the first state to enact the law for compulsory consolidation of holdings. The process

of consolidation has been completed in Haryana, Punjab and U.P. But this process has its own limitations because of non-scientific method of evaluation of soil quality of land and frequent litigations by the farmers. The policy was well thought of but the implementation in this case also became difficult. The other problem arose in the areas where consolidation was supposed to have been completed. The consolidation of holdings was disturbed by parcelling out the consolidated holdings between the siblings. There was no such condition that no further divisions can be made in future. In the absence of cooperative farming the division in smaller plots was inevitable. From our experience in Haryana, it is known that each chak (mustateel) contained 25 acres (murabba). Farms remained confined within the chak but further fragmentation went on.

The National Land Utilisation Policy:

Draft of the National land Utilization Policy, 2013 sets a number of goals to be achieved. It aims at achieving improvement of livelihood, food security and water availability, making provision for developmental targets so as to ensure sustainable development of India. It also aimed at" ensuring optimal utilisation of the limited land resources in India for achieving sustainable development, addressing social, economic and environmental considerations and to provide a framework for the States to formulate their respective land utilisation policies incorporating state specific concerns and priorities"

The major objectives as enumerated in the Draft are listed under certain concerns which are presented below:

Objectives related to Social Concerns

1. Protection of agricultural lands from land use conversions so as to ensure food security and to meet consumption needs of a growing population and to meet livelihood needs of the dependent population
2. To identify and protect lands that are required to promote and support social development, particularly of tribal communities and poor section of society for their livelihood.
3. To preserve historic and cultural heritage by protecting, places/sites of religious, archaeological, scenic and tourist importance.

   Objectives related to environmental concerns

4. To preserve and conserve lands under important environmental functions such as those declared as National Parks, Wild Life Sanctuaries, Reserved Forests, Eco Sensitive Zones, etc. and guide land uses around such preserved and conserved areas so as not to have land use conflicts or negative environmental impacts.
5. To preserve the areas of natural environment and its resources that provides ecosystem services.

   Objectives related to developmental/ economic concerns

6. To promote properly guided and coordinated development in a sustainable manner of all developmental sectors including agriculture, urban, industrial, infrastructure and mining so as to minimise land use conflicts or negative environmental impacts.

Objectives related to enforcement and implementation of the policy

7. To suggest a general implementation framework for implementing land utilisation policy by all concerned at different levels, viz. national, state, regional and local, and undertaking capacity building."

(Source: Draft, National Land Use policy: framework for land use Planning and Management, Department of Land Resources, Ministry of Rural Development, Government of India, July 2013)

The different concerns to be met require a comprehensive coverage at the national and regional levels. The policy has also sprung the whole issue of getting land to satisfy these concerns. Henceforth, the Governments acquired land for public good under the provisions of the Land Acquisition Act which was given by the British in 1894. The conditions, since then, have changed and the limitations of the old act had to be corrected. The new Land Acquisition Bill was proposed in 2013 and the Government of India has brought another version in 2014 but the bill has not been passed by the both houses of parliament to become an Act. The safe guard provided to the interests of the farmers whose land is acquired is the major question. The provisions of the new act will be known when it becomes an act in near future.

Major Features of Agricultural Land Use in India:

India has been, historically, an agricultural country where different typologies of cultivation are prevalent even during this era of technological development. There are areas of crop specialisations and plantations co-existing along with the areas with low level of agricultural technology. Crop production is qualitatively different from industrial production. While in industrial production, both quantity and quality can be controlled. The farmer has neither the control on the quantity nor the quality as the whole production process takes place in the open field. It is subjected to weather vagaries and hence production is uncertain. Agricultural production has witnessed ups and downs over the years after independence. The major objective of any agricultural activity is to provide food grains for sustenance of the population, take care of its nutritional needs by adopting diversified production system, provide raw material for agro-based industries and generate investible surplus for further improvement in agricultural technology. The other problem faced by agricultural production is uncertainty of prices in the market as the crops of all farmers are harvested at the same time and reaches the market simultaneously. The traders have upper hand as the farmers do not have storage capacity and the quality deteriorates with faulty storage. All the crops are not covered by Minimum Support Price. There are social and economic compulsions of the farmers forcing them to sell their produce as soon as possible bringing in an element of distress sale.

The share of agriculture sector in India's GDP has witnessed a sharp declining trend. After the independence, the share of agriculture in GDP was 55 % in 1950-51. The following table gives an idea of its decreasing trend from 2004-05 to 2012-2013.

Table 3 : Share of Agriculture in India's GDP

Years	Share (in percentage)
2004-05	16.0
2005-06	15.5
2006-07	14.7
2007-08	14.3
2008-09	13.3
2009-2010	12.3
2011-12	12.02
2012-13	11.65

Source: CSO, New Delhi

There are four ways of increasing total agricultural production; (a) by increasing the net sown area, (b) by increasing the productivity of individual crops, (c) by higher intensity of cropping (d) by replacing the low value crops by high value crops. It is not possible to increase the net sown area beyond a limit. In 1950-51, the net sown area accounted for about 41 percent of the reporting area which has moved up to 46.07 percent in 1999-2000 and continues to remain almost the same in 2013 also. It has remained around 140 million hectares for the almost the last 40 years.

Table 4 : Land use pattern in India (percentage to reporting area)

Land use categories	1950-51	1980-81	1999-2000	2011-12 (p)
1. Forest	14.24	22.18	22.52	22.89
2. Land not available for cultivation	16.71	13.02	13.51	14.23
(a) Land put to non-agricultural uses	03.29	06.56	07.31	8.60
(b) Barren and wasteland	13.42	06.46	06.20	5.63
3. Other uncultivated land excl. fallow lands	17.24	10.62	09.29	8.53
(a) Permanent pastures and grazing land	02.35	03.94	03.60	3.37
(b) miscellaneous tree crops and groves	06.82	01.18	01.18	1.03
(c) Culturable wasteland	08.07	05.50	04.51	4.13
4. Fallow lands	09.89	08.14	8.12	8.30
(a) Fallow land other than current fallow	06.13	03.26	03.29	3.49
(b) Current fallow land	03.76	04.88	08.82	4.81
5. Net Sown Area	41.77	46.03	46.07	46.04
Area sown more than once	04.62	10.73	15.83	17.80
Gross cropped area	46.39	56.76	61.90	63.84

Source: Agricultural Statistics at a glance, Directorate of Economics and Statistics, Department of Agriculture and Cooperation, 2014

There has been respectable improvement in the infrastructure and technology over these years which reflected in the increase in area sown more than once and gross cropped area. (Table-4) This has got translated into higher intensity of cropping over decades, at the national level (Table-5).This phenomenon is particularly witnessed in the regions of green revolution where irrigational facilities were made available. The increase in net sown

area was marginally possible by bringing in the fallow and culturable wastelands under plough through management of soil. While culturable wasteland has decreased, fallow lands have not shown substantial decrease at the national level.

Table 5 : Pattern of Net sown Area and gross cropped area (in million hectares) and intensity of cropping.

Years	Net sown area	Gross cropped area	Intensity of cropping in percentage
1950-51	118.75	131.89	111.07
1960-61	133.20	152.77	114.69
1970-71	140.86	165.79	117.70
1980-81	140.29	172.63	123.05
1990-91	143.00	185.74	130.00
2001-02	141.34	185.34	131.13
2011-12 (Provisional)	140.80	195.25	138.67

Source:" calculated from the data obtained from "Agricultural Statistics at a glance, Directorate of Economics and Statistics, Department of Agriculture and Cooperation, 2014

The story of agricultural development in India cannot be complete till it is woven from acute shortage of food grains after independence, which became a serious issue to the policy formulators and planners, till the country achieved a semblance of self sufficiency. In 1954 Rockefeller Foundation attempted to increase productivity of Corn, Wheat and Rice by intervening through improvement in seed and agricultural technology. USAID 'Food for Peace' popularly known as PL-480 programme brought wheat aid to India. The concerted efforts to increase food grain production in India were made in 1950s and 1960s. In order to diffuse improved agricultural technology through demonstration method, initially seven districts viz; Thanjavur (T.N) West Godawari (A.P.) Shahabad (Bihar)), Aligarh (U.P.) Ludhiana (Punjab) Pali (Rajasthan), Raipur (C.G.) were selected under "Intensive Agricultural District Programme" in June, 1959-60. Eleven districts viz; Aleppy, Palghat (Kerala) Burdwan (now Bardhaman) (W.B),Surat, Valsad (Gujarat),Jammu and Anantnag (J&K), Mandya (Karnataka), Bhandara (Mah), Cachar (Assam), Sambalpur (Odisha) were added in April 1961 and thus, these 18 districts started experimenting with the application of improved seeds, fertilizers and irrigation. "The objective of the I A D P or "Package Programme" is to promote the use of inputs such as fertilizers, improved seeds and insecticides, etc, in their most profitable combinations in areas possessing the maximum of advantages in regard to physical, climatic and institutional factors with a view to ensuring maximum returns on the package of these scarce factors in the shortest possible time. The districts selected therefore, are those which enjoy

the maximum of irrigation facilities, where the natural hazards like soil-erosion, floods and water-logging etc, are the minimum, and where service cooperatives are well-developed and the cultivators are receptive to improved practices. The basic infrastructure is thus given and growth is to proceed through the intensification of current inputs in their effective combinations." (Rao, 1964) It was expected that the technology will be adopted by the farmers of the neighbouring district and it will experience spatial diffusion. The adoption of new technology depended on the financial capacity of the individual farmers. Hence, the expected results were not achieved.

Indian agriculture witnessed the break through only after the introduction and adoption of the package technology based on irrigation, high yielding varieties of seeds, application of bio-chemical fertilizers as well as crop protection measures along with selective mechanisation. The policy of increasing the production of food grains to attain self sufficiency and to get rid of the dependence on foreign food aid programmes, the search for technology was on. Thus, Borlaug technology was adopted as it was made available and it got diffused in regions where irrigational infrastructure was in place. That was precisely the reason that this break though remained confined to only the regions in north western part of the country such as Punjab, Haryana and Western Uttar Pradesh. This whole area witnessed wheat-rice crop combination displacing pulses, coarse grains and oil seed and pushing these crops to drier areas. While maize and coarse grains have shown a production level of about 20 and 40 million tonnes respectively, the production of pulses has remained between 15 to 19 million tonnes which has resulted in the imbalance of demand and supply pushing up their prices in the recent past. It was the productivity per hectare of wheat and rice and their assured prices which attracted farmers to prefer and cultivate these crops. By the mid-eighties, the increasing trend in productivity flattened and ecological consequences of over- irrigation appeared. The policy of laying emphasis on increasing the irrigation infrastructure in other areas ensured the increase in food grains production generating a respectable buffer stock in the country.

Table-6, Food grain Production (Million tonnes)

Crops	2008-2009	2009-2010	2010-11	2011-12	2012-13	Estimates for 2013-14
Rice	99.18	89.09	95.98	105.31	105.24	106.28
Wheat	80.68	80.80	86.87	94.98	93.51	95.85
Jowar	7.28	6.70	7.00	6.01	5.28	5.25
Bajra	8.89	6.51	10.37	10.28	8.74	9.19
Maize	19.73	16.72	21.73	21.76	22.26	24.18
Coarse cereals	40.04	33.55	43.40	42.04	40.04	42.68
Tur	2.27	2.46	2.86	2.65	3.02	3.38
Gram	7.06	7.48	8.22	7.70	8.89	9.93

Urad	1.17	1.24	1.76	1.77	1.90	1.50
Moong	1.03	0.69	1.80	1.63	1.19	1.40
Total Pulses	14.57	14.06	18.24	17.09	18.34	19.57
Total Food grains	270.34	247.43	283.59	280.28	292.18	300.0

Source: ICAR, PIB Release ID105083

While production of food grains increased, the infrastructure for its storage was lacking leading to wastage. The wheat-rice combination still has higher production. The production of oil seeds and other coarse cereals particularly in green revolution areas lead to the thinking about diversification of cropping pattern. Johl committee was appointed to examine the efficacy of wheat-rice combination in Punjab in view of the negative ecological consequences of laying emphasis on both these water intensive crops by farmers. The committee recommended diversification in cropping pattern of Punjab, transferring one million ha of area out of 2.7 million ha from under rice to other crops such as pulses, oil seeds and high value crops with compensation/incentives to the farmers, for the sake of restoring the water balance in the central Punjab districts. Somehow the recommendations were criticised by the scholars in Punjab and the Central Government did not come forward to arrange for the compensation money to the farmers who agreed to diversify their cropping pattern. The number of farmers committing suicides in Punjab is indicative of the fact that all is not well in one of the agriculturally most progressive states of the country. India has a large tract extending from parts of Haryana to the Karnataka plateau which is drought prone. Besides this tract, some districts in higher rainfall regions also suffer from drought such as Rarh area of West Bengal, Jharkhand, plateau, area of Odisha and southern districts of Tamil Nadu.. Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP) were specifically aimed to increase agricultural production by using the dry farming techniques and ameliorate the economic conditions of the weaker sections of the society in these areas of the country.

India has witnessed increase in the production of horticultural crops, particularly vegetables and fruits during recent periods. It is second in the production of vegetables as China occupies the first place. India is the largest producer of fruits in the world. According to the data of National Horticulture Board, the acreage under vegetable crops was 5593 million hectares and the production was 58,532 million tonnes in 1991-92. The vegetable acreage increased to 9,205 million hectares and the production was recorded to be 162,187 million tonnes in 2012-13 registering an increase of 64.58 percent in area and 177.09 percent in production. West Bengal leads both in area and production of vegetables. The State recorded the highest production of vegetable in the country followed by Uttar Pradesh and Bihar. Other important states in the production of vegetables are Madhya Pradesh, Andhra Pradesh, Gujarat and Odisha. There has been substantial increase in the area under fruits during 1991-92 at the national level. The area under fruits has increased from 2,874

million hectares in 1991-92 to 6,982 million hectares in 2012-13. The production has also registered increase from 28,832 million tonnes to 81,285 million tonnes during the same period. While the area has registered an increase of 142.9 percent and the increase in the production during this period has been 182 percent.

Table 7 : Important States producing vegetables and fruits in India

States	Vegetables (in percentages)		Fruits (in Percentages)	
	Area	Production	Area	Production
West Bengal	14.64	15.70	3.16	3.90
Uttar Pradesh	9.91	12.06	4.67	6.37
Bihar	9.36	10.07	4.32	5.23
Odisha	7.50	5.84	4.72	2.72
Andhra Pradesh	7.45	7.46	13.47	17.02
Madhya Pradesh	6.65	7.75	2.88	6.70
Gujarat	5.84	6.49	5.46	10.35
Maharashtra	5.15	4.94	22.18	12.04
Karnataka	4.74	3.08	5.56	8.14
Tamil Nadu	3.02	4.87	4.44	8.24

Source : calculated from the data obtained from Indian Horticulture Data Base, 2013, National Horticulture Board, Ministry of Agriculture, Government of India.

Table -7 shows that Maharashtra leads in area under fruits but Andhra Pradesh leads in the production contributing 17.02 percent of the total production of the country followed by Maharashtra and Gujarat. The emphasis on the production of vegetables and fruits indicates diversification of cropping pattern and market orientation.

It is expected that as the income of people increases, the demand for high value food products such as fruits, vegetables, milk products, eggs and meat will go up and the production system would responds to this demand. The scholar has based their argument on 1987-88 National Sample Survey data on consumption. It was reported that with the rise in income consumers spend higher proportion of their income on superior foods. Hence, it is expected that their demand for food grains will go down considerably. Thus the demand driven changes are expected to take place in supply system. The cropping pattern and other allied activities will be going to respond to the demand. But this also means that there will be a shift from the area under food grains to the fodder crops and some proportion of the grains have also to be allocated to prepare the feed and concentrates for poultry and milch animals. Prof G.S.Bhalla had echoed the trends almost two decades earlier. “India is currently characterised by low per capita income and large population, which is growing rapidly. With per capita income growth expected to accelerate, the result would be a rapid growth in the direct

and the derived demand for food grains. It is rather curious that while a detailed and technically highly sophisticated work has been done on food demand models in India, hardly any systematic research has been done for estimating the derived demand for cereals and other constituents required for feeding the milch cattle. This is in spite of the fact that the demand for milk products and that for meat and eggs is increasing at a phenomenally high rate" (Bhalla, 1995). The land and food production policy makers have to take note of such shifts across different regions of the country.

The other important phenomenon affecting agricultural land is the expansion of area under urban settlements creating competition for land. This competition has been accentuating on the rural-urban fringe where agricultural land is being converted to accommodate the urban functions such as housing, manufacturing and trade. The housing activities along the peripheries of the cities by builders have eaten away fertile agricultural land. There is an economic trade off which compels the farmers, as economic person, to sell off their land. With the economic growth, land is required for infrastructure development such as roads, rail network and creation of SEZs and large chunks of land have been acquired for the purpose. Extended urban centres are emerging such as Gurgaon, conurbation areas between Delhi and Ghaziabad as well as Delhi and Faridabad. The urban development activities in National Capital Region are taking place on fertile agricultural land and land use changes have been taking place very frequently.

The Geo-spatial technology has enabled the geographers to have better grasp of land use and land cover changes. GIS as a tool can handle vast set of spatial data. It can also map the pattern of temporal fluctuations in the environmental parameters of agriculture to enable the planners to adjust their models. Remote Sensing and GIS tools can also be used for studying the soil quality, status of soil erosion, land use and land cover changes as well as fluctuations in crop outputs.

Unfortunately, we, the geographers have missed many opportunities and failed to take up micro level regional studies which enable us to understand many social and economic issues. There are glaring gaps in our studies. While reviewing the question of Food Security for the research survey of ICSSR, we realised that there are very few studies contributed by geographers during 2003-09. Many of our elder geographers have done much more relevant empirical work in various regions of the country than our own generation. It is our expectation that our younger generation which is technologically more empowered will use the technology with sound philosophical and scientific understanding of the phenomena to come out with scientifically correct and socially relevant conclusions.

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M. H. Qureshi
Ex. Professor,
Centre for the Study of Regional Development,
School of Social Sciences,
Jawaharlal Nehru University,
New Delhi-110067