INDIA 2020

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Introduction

I am grateful to the President of the Society Prof. Dilip Nachane and Prof. Manohar Rao for the honour of asking me to deliver an invited lecture at the Conference. As a past President of the Society I share the feel good aspect of the Society's achievements and welcome you to Gujarat.

The Planning Commission has recently released the Report of the Committee on India Vision 2020. (Jan.23, 2003, under the Chairmanship of Dr. S.P. Gupta).In consultation with the Office of Strategic Management of the Secretary General of the United Nations, the United Nations University had initiated studies on A Sustainable Development Framework in Large Developing Countries in China, India and Indonesia (For a strategic view of the problems of the new millenium, See H. vanGinkel and R. Thakur, Embracing the Millennium: Perspectives and Challenges for the United Nations and the International Community, UNU Millennium Series, 2002- for a large country perspective in this volume, Yoginder K. Alagh, pp.73-84).Large Countries matter in this context on account of their size, their impact and the possibilities of strategic choices. I am told there is consulting interest in this subject and business groups are also making projections.

The Economy

There has been by now global acceptance that India has been growing fast in the last two and a half decades and that in fact the Eighties were a period of equally good if not better performance. This change in mind set of economists working outside India is good, even though belated, for some of us have been writing for over a decade that India is growing fast and that its reform started in the Eighties, (Y.K.Alagh, 1991, WIDER Studies in Development Economics). I suppose in a WTO dominated IPR regime, cheap editions of books published in the third world are not read. Economists from Harvard, the IMF and the NBER are saying the same thing, so now I suppose this is orthodoxy. We said "There are therefore two characteristics of growth in recent years. It is higher. It is more stable. The characterization of the economy as a gamble in the monsoons needs change." (Y.K.Alagh, IJLE, 1996). But now the World accepts it. {Arvind Virmani; Rodericks and Subrahmanian; Delong.} The consequences are only now dinning in. I am working on a project set up by Prime Minister Paul Martin of Canada, which has the objective of including India and China in the Head of State level discussions, say in the G 20. A recent paper for that project shows that India has already arrived. According to J.Kirton in work done for the G 8, the Indian Economy is now the fourth largest in the World, next only to the U.S., China and Japan, having in absolute size crossed the economies of countries like Britain, France and Germany, as his estimates reported below show.

India must now address the practical task of higher growth. GDP growth from 1980 to 1990 was 5.6% and not statistically significantly different at 5.7% from 1991 to 2002. In 1997 in my Inaugural

Address to the Indian Society of Labour Economics at Trivandrum, I had comparing the period since the late Seventies with the earlier period argued:

"Per capita growth was less than 1% in the early period and is 2.65% in the later period. In the later period, registered manufacturing is growing at around 7.5% and agriculture at above 3% (Table-2). In the early period agricultural growth was appreciably lower. Growth is now becoming a built-in part of the structure of the Indian economy. Table 3 suggests that in the Eighties, there was hardly any year in which the growth was less than 3% compound annual and in around 80% of the years it was more than 4% compound annual. The situation was the other way round in earlier decades." (Alagh, IJLE, 1996)

Another argument given is that growth in the Nineties is more stable than in the earlier decade. This is also incorrect. Growth in the last two decades is more stable than in the Sixties and early Seventies. "Thus in the decade of the Fifties, GDP growth was less than 2.8% in fifty per cent of the years and in the remaining years, it was more than 5.7%. In the decade of the Sixties, this behaviour persisted and growth was less than 3.1% or negative for fifty per cent of the years and in the remaining years it was more than 5.1%. However, from 1975-76 to 1996-97, a growth performance of less than 3.1% was there in only three of the twenty one years. There are therefore two characteristics of growth in recent years. It is higher. It is more stable" Alagh, IJLE, 1996. Thus growth in the eighties and nineties is more stable than earlier periods and the differences between the eighties and nineties are marginal.

Finally although there is now recognition of Indian performance in the Eighties, the reasons given for it are incorrect. Rodericks and Subrahmnanian say that growth in the eighties was on account of a regime which was dominated by business. They have no idea of the strategic nature of the policy making setup in the Eighties. The development of industry level rules rather than firm level interventions, dual pricing for equity reasons, of competition at home to lay a transition for the later reform and the use of trade and fiscal policies for these objectives have been extensively described elsewhere and the perceptions of the converts abroad are not only quite late in the day, but are also incomplete and incorrect.

Firm level price and output controls were abolished and there was a policy of relaxing investment and foreign exchange controls. These were replaced by tariff and tax policies. The road map was outlined by the Committee on Replacing Quantitative Controls by Fiscal Methods or the Narasimham Committee of which I was a member. The emphasis was on domestic reforms and preparing Indian industry for global competition, but there was discrimination between industries with a view to encouraging self-reliance, production of mass wage goods, was still an objective, as also that of creating a level playing field for efficient Indian industries as the economy was subjected to competition. Cement, aluminium, steel and a number of other industries were decontrolled and import licensing relaxed. Tariffs were however high and discriminatory and there was the so called 'savage' policy of taxation of luxuries.

The Nineties saw a more general economic reform of the kind designed by the Brettenwoods institutions. The exchange rate on current account was left to market forces, import control on producer

goods and intermediates was largely abolished, tariff rates were standardised and the average level brought down. Policies on sectoral and regional direction to industrial investment, MRTP control and controls on FERA companies were diluted or given up. The level of public investment in industrial and infrastructural sectors was drastically reduced. An earlier policy of restructuring an privatising selected public sector industry was changed to a general policy of disinvestments, with initial emphasis on selling profitable public enterprises to the private sector, to overcome 'initial resistance to purchase of public sector equity'.

Meanwhile the facts on global rankings are as follows:

Table 1
G20 AND GLOBAL COUNTRY CAPABILITIES

Country	*GDP [rank]*	*Democracy*
a. G8 (excl. EU)		
Canada	$934.1 billion [12]	Free
France	$1.558 trillion [6]	Free
Germany	$2.16 trillion [5]	Free
Japan	$3.651 trillion [3]	Free
Russia	$1.409 trillion [9]	P Free
Italy	$1.455 trillion [8]	Free
Britain	$1.528 trillion [7]	Free
United States	$10.45 trillion [1]	Free
Others in G 20		
Argentina	$403.8 billion [23]	P Free D
Australia	$525.5 billion [16]	Free
Brazil	$1.376 trillion [10]	Free
China	$5.989 trillion [2]	Not Free
India	$2.664 trillion [4]	Free D
Indonesia	$714.2 billion [15]	P Free
Mexico	$924.4 billion [13]	Free
Korea	$941.5 billion [11]	Free
Saudi Arabia	$268.9 billion [29]	Not Free
South Africa	$427.7 billion [21]	Free
Turkey	$489.7 billion [17]	P Free

Source: John Kirton.

According to the ISI Calcutta, in a UN project sponsored by the present author (Y.K.Alagh, 2000,UNU) a one percent increase in real inputs led to a 3.8% increase in output in the eighties and a slightly lower increase in the nineties. This has now to go up to five percent so that the dream of a 8% growth is achieved. As the projections contained below show, factor productivity has to go up to around 5.1 if growth rates of around 8.4% annual are to be achieved. We must save more (28% rather than 23% of GDP), work harder and reform more to take on the World. Our trade in two decades must

double as share of GDP. This will take India to be the third largest economy of the World by 2020, rather than trudge along at the present pace, which will mean the fifth place and a have been of History. The Economic Survey, 2003 says that growth became a habit from 1979, but this implies that raising it is difficult, since habits don't easily change.

GROWTH OF OUTPUT, FACTORS OF PRODUCTION AND TFP FOR SELECTED SECTORS IN INDIA: 2000-2020

(Percentage)

Period	*Scenario - A*				*Scenario - B*				*Scenario - C*			
	GDP	*Capital*	*Labour*	*TFP*	*GDP*	*Capital*	*Labour*	*TFP*	*GDP*	*Capital*	*Labour*	*TFP*
Total												
2000-10	5.35	4.79	2.09	2.96	6.90	4.79	2.47	4.17	7.54	4.79	2.69	4.62
2010-20	6.04	4.04	2.27	3.58	8.59	4.04	3.15	5.34	9.24	4.04	3.49	5.69

To put it in a somewhat stylized manner:

India will grow between 6 to 8% annual and will become the third or fifth largest economy of the World in this period. The investment rate and productivity growth will be the drivers. For example around a third of India's GDP growth in 97/03 is technology driven. Trade will also matter-will become around 4%GDP.

GROWTH OF OUTPUT, FACTORS OF PRODUCTION AND TFP IN INDIA: 1970-2000

(Percentage)

Period	*GDP*	*Capital*	*Labour*	*TFP*
1970-80	2.60	3.59	1.98	0.49
1980-90	5.67	4.41	1.13	4.21
1990-00	5.73	5.97	1.82	3.68

Source: Y.K.Alagh, UNU,2000

The Drivers will be:

- Investment
- Technology and Productivity: Knowledge
- Trade and Competition

Productivity growth analysis Scenarios indicate that in order to sustain a high growth of the economy of the order of 8 to 9 per cent as given in the so called Scenario C the TFP has to grow by 5 per cent or more. Trade and Competition will give the edge. Some estimates suggest that trade shares of around 4% of GDP may be needed. Frugality needs investment rates of 28% annual. These economic preconditions will have to be fulfilled if the positive projections are to be achieved.

There are also other problems in managing long term growth strategies of a sustainable kind. As far as non-renewable resource scarcities is concerned it is useful to begin with the kind of

problemetiques the sustainable development framework studies bring out. The "Business As Usual Scenarios" bring out unsustainable outcomes.

The Planning Commission's Perspective

The Commission has to be congratulated for attempting a perspective. It is "neither a prediction", "nor simply a wish list" , but "what we believe it is possible for our nation to achieve ... provided we make the requisite effort." (p.1). The analytical method the Commission seems to have followed is interesting. They construct a reference scenario of UMI (Upper Middle income Countries), which India will meet as a target, rather than the earlier tradition of the PPD of a national model. In addition the Commission have a sectoral vision of major sectors and issues like sub-models on energy, water, agriculture and communications and transport. Also issues like population, urbanization and governance. I am happy at the latter, since the tradition of Sub-Models for Agriculture, Energy, Employment and Demography was started by me in the Planning Commission as PPD Advisor in the Seventies. (See Alagh, et. al., 1987). The sub-models then were carefully calibrated with the Plan Model. Such calibration is not necessary, in a long term vision statement in detail, but some efforts in consistencies in alternative approaches to genuinely long haul issues like land, water, income growth and population can be rewarding .This is particularly so if the Vision is a guide to action.

Vision statements have obvious sex appeal in a political economy sense, but their real social use is that some issues really need a long term view on decisions to be taken today. Keynes talked of "madmen and visions". There is danger in this game. Fascists and dictators, for example have always cashed in on visions of forcibly redrawing society in their narrow view. The Planning Commission is to be congratulated in releasing a document in which it is stated in italics and with emphasis that "True Spirituality will not make us less tolerant."(p.94). In a society on the make, a "Vision Statement" can be taken seriously only if it outlines the decisions which have to be taken today to realize the stated objectives. Otherwise there is no meaningful way of evaluating it. The Planning Commission has played the role of Brahma. It wants a high growth economy and an educated, healthy, technologically progressive society, caring for its water and land, removing poverty and unemployment and rapidly urbanizing.

The Tinbergen Theory of Economic Policy would like us to build a structure where we go from objectives through the structure to the instruments to be worked on. These instruments would tell us what we should do and what we should not do in unambiguous terms. Apart from Brahma, there has to be Vishnu (What to Do) and Mahesh (What not to Do) or what to kill.

The Problematique

- Projections for the Year 2020

• POPULATION	1330 million	
• URBAN POPULATION	Low : 465 million;	High : 590 million
• SLUM POPULATION	Low : 85 million;	High : 130 million
• SOLID WASTE DISPOSAL	100 to 110 million tonnes	
• DEMAND FOR COAL FOR POWER GENERATION	Low : 817 million tonnes;	High : 2016 million tonnes

• CROPPING INTENSITY	More than 1.5
• NET AREA SOWN	Constant at 141 million hectares since the nineties
• IRRIGATION INTENSITY	Around 1.75
• WATER SHORTAGE	Around 10% to 25% between the years 2020/50
• NOISE LEVELS	Twice the norms in trend forecast
• AIR POLLUTION	Two to two and a half times the norms in trend forecast

Source: Y.K.Alagh, *Sustainable Development India:2020*, Tokyo, UNU, 2001, as quoted in,Y.K.Alagh, *Global Sustainable Future and Developing Countries*, in Fu chen Lo, et.al., ed., op.cit.

These illustrative quantitative magnitudes show the sharp breaks in many indicators and unmanageable problematiques emerging in major concern areas.Solid waste disposal levels of more than 100 million tonnes, slum population of around 100 million persons, acute water shortages and air and noise pollution of a severe kind, all manifest themselves. The serious environmental implications of burning poor quality coal are apparent underlining the critical energy situation in the country. The glaring magnitudes indicate the long-haul for improving the living standards in the country. This also brings into sharp focus the hazards of following an unbridled consumerist path both at the global and national levels.Serious Vision documents should also warn against impending tragedies.

The UN Country case studies on large countries also bring out the severity of constraints being faced and the need to make a beginning to " favourable " paths immediately. China and India are two examples. Growth in large countries underlines the quantum jumps being faced. Indian studies make the point that if severe water shortages are to be avoided, the improvements in irrigation efficiency and cropping intensity will have to be much faster than historical rates. If bad coal of over a billion tonnes is not to be burnt for power needs, alternative energy management styles will have to be implemented and hydel and nuclear options considered, in addition to a major focus on renewables. If BOD disposal is to be kept in reasonable limits from slums, a strategy of decentralised urbanisation will have to be followed. Modern technology will have to be integrated with artisan and rural populations so that the benifits of national and global markets can percolate to the work force. (Alagh, UNU/IAS, 2000). Trade and globalisation will have to grapple with these questions. Regional arrangements may well be a part of the answer. If these kinds of links cannot be established in concrete terms, the concept of an enduring future will remain an empty box.

Sustainable policies are not just questions of global negotiations, but have to grapple with issues of energy requirements, land use, food demand changes and agriculture and technology for meeting industrial and service requirements. If communities are out of balance with their resource endowments, there can be no question of significant advance in the areas of global concern like carbon sequestration or biodiversity.

Energy

The Planning Commission has used very genteel energy forecasts. They are the energy importers paradise. Hydel shares fall in a big way by 2020 and the nuclear share , at present much higher than the 97 base level they take, doesn't rise much from the present. This is both in the BAU and BCS scenarios. Coal demand is kept at half a million tonnes, only by massive imports of oil and gas. As

an afterthought after the projections they add on even larger renewables, but it is well known that there is a limit to such a strategy, however much we push it and even the 5% renewables provision in the BCS scenario is tough although worth aiming at.

Alagh, op. cit.,has used work by the late J.P.Maggo, who collaborated with him in the India 2020 study and which is close to recent French-Swiss models, summarized below which clearly bring out the need for public policy initiatives in the energy sector, rather than relying on a private profitability dominated strategy alone. This will require some firm decisions.

SWISS-FRENCH ENERGY PROJECTIONS FOR INDIA

S. No.	*Fuel Source*	*1996*	*2020*		*2050*	
		Actual	*Bu*	*Eff*	*Bu*	*Eff*
0	1	2	3	4	5	6
	%age share of:					
1.	Coal	30	38	35	33	32
2.	Oil& Natural Gas	24	50	50	62	61
3.	Renewables	46	12	16	5	7
	[In (3) fuelwood falls, solar, wind, hydel, nuclear increases]					
4.	% growth over 1996 of Primary Energy		327	263	853	683

Source: O. Scwank, T. vonStokar and N. North, Long Term Carbon Emmission Targets, in P.Audinet, et.al., (ed.),Essays On Sustainable Development, Delhi, Manohar, 2000, p.135. Also see Foreword by Yoginder K. Alagh

Notes: Bu is Business as Usual,Eff is Energy Efficiency.

Once upon a time India was very good at this kind of modelling work, but no more serious work of this kind is being done. Most of our so-called projections are back of the envelope guess work. Meanwhile most serious studies show India as the hot spot for energy future outcomes. Some of these studies include the following:

Kenji Yamaji, *Modelling Global Energy Systems to Address Climate Change,* in Fu chenLo, H. Tokuda and N.S. Cooray, UNU-OECD, 2000. Also in the same volume.

- Shunsuke Mori, *Maria Simulations Under SRES and post SERES Scnarios*
- T. Morita, *Global Modelling and Future Scnario for Climate Stabilisation*
- H. Pitcher and T. Morita, *SERES and POST- SERES Scenarios*
- Yoginder K. Alagh, *Global Sustainable Future and Developing Countries*

Serious energy models bring out:

- The Need to Complete the Nuclear Fuel Cycle on thorium and to rapidly expand the Fast Breeder Technology Power Plants. The recent experience on nuclear power clearly demonstrates the economic efficiency of the sector, if the research costs are borne by the State. The author's Lov Raj Kumar Lecture on Fuel For Power and Air Marshal Lal lecture

on Technology and National Security bring out the economic wisdom of both decisions. Research is the need here, and also an attempt to establish negotiating strategies with countries like the USA, France and Japan.

- The need to rapidly expand hydel projects with state of art project preparation and implementation techniques
- The need to complete the HVDC National Grid
- And as the Commission say to develop a Regional Energy Policy
- The need to Expedite Energy sector economic reform as a part of strategic policies for the sector.

Unfortunately in the privatisation debate, the need for strategic initiatives and public sector reform is heavily discounted. There is nothing new in all this. As Power and Science and Technology Minister, we saw to it that upto 2000 MWs was shipped for the first time from Kashmir to Kanya Kumari and a National Grid with an Availability tariff approved. A Fast Breeder Reactor based Nuclear power plant was approved and is expected at KudanKulam. The S&T agreement initialled with the USA provided a framework for discussion on high technology issues. A Strategic Relationship was established with France with the visit of the French President to India in January 1998. A New Hydel Project Planning Policy was approved. CEA also released a 8000 MW mini hydel power project compendium, ready for implementation by the States.The Cabinet approved the draft Energy Efficiency Bill, which is now law.

Land and Man

In earlier work we had shown that according to Planning Commission estimates population figures are expected to go up from 856 million in 1991/92 to 938 million in 1996/97, showing an annual average growth rate of 1.8% (Table below). If the growth rate remained around 2%, this figure would go up to 955 million. (See Kumar, Saxena, Alagh and Mitra, 2000) According to indications then we had argued that the actual figure would be in between these two figures since the death rate had fallen below even the 2000 target, but the birth rate was below target, hence population growth would be around 1.9%. If the population growth rate further declined, as postulated by the Planning Commission in the second half of the last decade of the last century, the estimated population would be around 1016 million in 2000/01 and in any case will be below the rate of around 2% as estimated by the earlier UN projections, of around 1042 million in that year. These developments have now been taken into account by the UN and the 1998 revised population projections of the UN estimate India's population in 2000/01 at 101.37 million. As of March 2001, the Census estimate of the population is 102.7 million persons. If India was able to achieve a population growth rate of around 1.6% in the decade 2000/01 to 2010/2011, its population would reach 1171 million, if the Planning Commission projections were used as a base. Even if this target was exceeded the figure would be less than 1224 million as estimated by the UN earlier. The revised UN projections are now 115.22 million. For the year 2020/21, the UN projections are now 127.22 million. These projections have not incorporated the details of the 2001 census. The Registrar-General's Working Group on Population Projections set up conventionally by the Planning Commission, will have to firm up these alternative conjectural projections,

in terms of underlying fertility, mortality and expected life span behaviour, by age-group and rural-urban categories. The details of recent population projections and changes in them have been outlined to show that there is a level of tentativeness about the available population projections and the detailed country level projections are necessary. For large countries, attention to detail is necessaty, since differences can have substantial impact as we have seen and this in turn can influence substantive issues and judgements. For the purpose of this study UN projections given by the UNU/IAS have been used:

The other major category needing examination in this kind of perspective is the land or resource base of the economy. The Planning Commission has correctly projected that the net area sown or arable land of the country will remain constant at 141 million hectares. Growth in net area sown at around 1% annual in the early period of planning fell to around 0.6% and then to 0.3% in subsequent decades and is now not growing at all. It is reasonable to assume that the geographical area of the country or the extensive land frontier for exploitation has reached its limits. This is an important issue, the implications of which are not being realised with the urgency they deserve, since at a basic level resource constraints of a more severe kind faced by certain East Asian economies are now being approached in India. Organisations, communities, households and individuals will have to grasp this fact and live with it.

LAND AND WATER RESOURCES IN PERSPECTIVE

Sl. No.	*Variable*	*1991/2*	*1996/7*	*2001/2*	*2006/7*
1.	Population (millions)				
	(a) Planning Commission•	856	938	1016 ∂	1099
	(b) UN (Unrevised)	874 ∂	955	1042	1130 ∂
2.	Net Area Sown (mn. hec.)				
	(a) Planning Commission estimate	140	141	141	141
	(b) Revised		141	141	141
3.	Gross area sown (mn. hec.)				
	(a) Planning Commission estimate	182	191	197	203
	(b) Revised	183	191	197	205
4.	Gross Irrigated Area (mn. hec.)				
	(a) Planning Commission estimate	76	89	102	114
	(b) Revised	64	78	92	107
5.	Cropping Intensity				
	(a) Planning Commission estimate	1.30	1.35	1.40	1.44
	(b) Revised	1.30	1.35	1.40	1.45
6.	Gross Irrigated Area as % of Gross Area Sown				
	(a) Planning Commission estimate	41.5	46.9	51.7	56.1
	(b) Revised	35.0	41	46	51

Source: Perspective Planning Division, Planning Commission FAO, Agriculture Towards 2010, Rome. Revised projections are tentative and are by the author.

Note: ∂ Interpolated or extrapolated from implied trends.
• Planning Commission estimates will be revised for Tenth Plan.

UN POPULATION PROJECTIONS

Year (1)	*Population (million)* (2)
2000	1012.66
2005	1087.46
2010	1152.16
2015	1211.67
2020	1271.17

Source: Mukherji, et.al.

The intensive frontier for land use, however, remains. It has been known for example that cropping intensity depends on irrigation. Thus gross cropped area or harvested area has been shown in the past to be strongly determined statistically, in an econometric sense, by net irrigated area and irrigation intensity. Irrigation permits the possibility of multiple cropping by bringing additional land under cultivation and the same land to be used more than once. Also the application of new technologies in the past was related to assured water supply. The new technology, on account of its photo insensitivity properties, permits shorter duration crops, which also is associated with increase in cropping intensity. (For details of this relationship in agricultural planning and policy models, see Alagh, et.al. 1987). The use of this relationship has been used in Indian agricultural policy and plan models, since the mid-Seventies when the first agricultural sub-model of Indian planning was formulated for grain self reliance (See Alagh, et. al., Planning Commission, 1987). The parameters used in different plans were as follows;

Sr. No.	*Plan*	*Additional Irrigation Utilisation (mn. hec.)*	*Additional Cropped Area (mn. hec.)*	*Elasticity of GCA w.r.t. GIA*
0	*1*	*2*	*3*	*4*
1	Fifth	9.11	6.04	0.20
2.	Sixth	13.80	11.74	0.26
3.	Seventh(O)	10.90	10.00	0.31
4.	Seventh®	9.50	7.60	0.24

In the Nineties as we noted arable area has stopped growing and so the land constraint is far more severe. Growth will now have to be sourced from double cropping and yields.

This fundamental relationship can be used to project the intensive resource base of the economy. Table shows that by the end of the decade India would have used up most of its balance water reserves, with the irrigated area reaching around 114 million hectares by 2010. (See Alagh, 1995, p. 395 and above table). The projections for 2020 are a requirement of irrigation of 122 million hectares for irrigation (K. Chopra and B. Golder, Table 2.6)

The projections assume a vastly improved performance on the land and water management frontiers. It needs to be remembered that the balance ground water reserves are now more limited. A very dramatic effort will be needed to harvest and carefully use the available water. Otherwise, the projected increase in cropping intensity will simply not take place. Cropping intensity increased from around 1.18 at the beginning of the Seventies to around 1.3 in the early Nineties. In the next two decades, this effort needs to be considerably strengthened, so that cropping intensity can increase from 1.3 to 1.5. Harvesting of rainwater, recycling water from agricultural drainage systems, more judicious use of water for cropping, will all be required. Non-agricultural use of water will have to be far more economical. The detailed exercise done for this study requires that in the sustainable scenario 35.83 BCM of water are saved by conjunctive use of surface and groundwater and 142 BCM through harvesting of runoff. (Chopra and Golder, Table 2.6)

The analysis strongly suggests simultaneous action on surface water development, both large and small projects, ground water and conjunctive use and efficiency in water use. Recent interesting work includes sensitivity of estimated resource flows of water available with integration of surface flows with local small storage projects. Alagh (2000) has reported an augmentation to the extent of 14% of estimated water availability as follows:

TANK STORAGE IN SHEDHI SYSTEM

Year	*No. of Tanks Deepened (progressive) MCM (m)*	*New Capacity Creation*	*Range of Deepening*
Season 1993/94	150	3.5 (6.0 to 9.9)	1 to 6
By June 1994	254	6.0 (7.9 to 13.9)	0.25 to 9.3

14% additional water cannot be considered trivial in a water short context. It is interesting that the Shedhi Branch of the Mahi system was planned on the basis that there are no tanks in the system.

Another way of looking at the severe land constraint is to see that a net area sown per person will go down from around 0.17 hectare to around 0.10 hectares. Gross area sown per person currently around 0.2 hectares will even, if cropping intensity increases very rapidly, go down to around 0.15 - 0.18 hectares.

By 2020, Chopra and Goldar estimate a BAU Scenario:

"In such a scenario, overall water shortage or deficit is only of 2%. This is accompanied by an under utilisation of surface water capacity of 21% (due to low water use efficiency) and an over-extraction of ground water of 25%. Such an unbalanced growth shall itself be the source of a considerable amount of unsustainability.

The second interpretation of the BAU scenario is motivated by the need to estimate regional shortages or surpluses. The BAUST or the business-as usual with the state level estimates is made by assuming that surface and ground water development follow the trend extrapolated from the past.[1]

1. Following such a methodology implies that the two estimates should not be compared. The BAUST estimate is motivated by the need to identify regional shortages or surpluses of water, while the BAU estimates determine the impact of food security objectives on water demand.

The regional analysis reveals that over-extraction of groundwater shall emerge in eight states. In addition to Gujarat, Haryana, Punjab and parts of Uttar Pradesh which are characterised as areas with over-use of ground-water, Andhra Pradesh, Maharashtra and Tamil Nadu are also expected to be subject to over-extraction. Surface water shortages may start emerging in some states such as Gujarat, Bihar, Maharashtra and Orissa." and again taking population projections and the energy models as developed by the AITD urbanisation study and suitable assumptions they estimate:

"The total requirement for households, power and industry is 103.62 BCMs in the BAU scenario. Adding evaporation loss and ecological requirement we obtain a total requirement of 223.62 BCMs for requirements other than agriculture."

Chopra and Goldar also estimate a high growth scenario. Then:

"The high growth scenario at the national level implies a rate of growth of agriculture of 4.98% per annum with the food grain sector growing at 2 to 2.4% p.a. and the non-food grain sector at 7.69 to 9.22% p.a. Irrigated land requirement increases to 122 million hectares. With present levels of water use efficiency, water requirement increases to 804.2 BCMs. This implies a shortfall/water deficit of 22%. The manner in which this translates into over-extraction of groundwater or other indices of unsustainability depends on policies pursued and cannot be ascertained. It is, however, clear that both the high growth and BAU scenarios are likely to result in unsustainable demand for water of one kind or the other in the absence of specific investments and policies directed at improvement of water-use efficiency and other sustainability promoting measures.

The requirements of the households, power and industry sectors likewise add up to 120.57 BCMs in the HG scenario as against 103.62 BCMs in the BAU scenario.

Regarding the quality of water they say

"An important issue which our analysis brings out is that at present levels of urban wastewater and effluent treatment, water quality will deteriorate significantly, impacting availability as well in certain areas. The reduction in water availability due to quality problems is expected to be substantial.[2] We use this evidence to underscore the need for and the corresponding benefit from "sustainability investments".

Chopra and Goldar then develop a sustainable policy scenario:

"It is clear from the above analysis that, in order to achieve sustainable water development, consistent with sectoral requirements arising from a sustained 7 to 8 % annual growth in GDP and other accompanying changes in the economy, a large number of interventions shall be required. These interventions could be technological, institutional, or supply augmenting possibilities. Table list some interventions for sustainability we suggest, including watershed management, drip irrigation, and institutional arrangements, such as water users' associations, that help in more efficient use of water. Some of these have been experimented with in different contexts and we estimate (on the basis of existing studies) the extent to which they can be expected to spread over the next twenty years. Corresponding costs are also worked out. These are, in other words, the costs to be borne for ensuring sustainable use of water. Other interventions suggested involve costs which are either difficult

to measure, involve uncertainty or are not only economic costs but also perhaps political in nature. Further, interventions are also classified according to whether they are to be undertaken on presently irrigated land which is privately owned, or consist of interventions on land (possibly under private, common or government ownership) to be brought under irrigation."

Nature of Interventions under Sustainable Scenario

Nature of interventions	*Sector*	*Water Saving/Addition (in BCMs)*
Demand management/ Recycling technology	Households	22.51
	Power sector	7.29
	Industry	13.86
	Agriculture	35.83
Supply Supplementing	Additional Runoff Capture	142.00
Total Water Saving/ Augmentation		221.49

While some of the interventions suggested are well known, others involve fresh thinking, hence we discuss them in some detail, with theoretical and experience based analysis.

The technology interface is important, both for land and water management and for cropping and non-crop farm systems that are optimal, in this class of issues. While a lot of research has been done and is available, (Alagh, FAO/ UNESCO, 2002) the real issues are policy rules for fast replicability of existing knowledge and success stories. Community institutions have to be at the heart of this process.

Conclusion

The Planning Commission is right. Anything is Possible. Chopra and Golder have a detailed list of necessary interventions, technological, supply management, demand management and institutions. They have quantified the impact of these. In my World Food Day Lecture at Bangkok I also have argued that the real issues are policy rules for fast replicability of existing knowledge and success stories. Community institutions have to be at the heart of this process. (Y.K.Alagh, FAO, RAP, Bangkok, 2002). Given its projected scarcities of non-renewable resources, it has been argued that India must integrate its domestic reform with interregional trade in energy and water.(See Y. K. Alagh, UNU/IAS, 2000). For example an announcement that it will pay the LRMC price for energy will buttress its negotiation stance in South Asia and also makes economic sense.(See Y.K.Alagh, *Our Common Future,Working Paper No.28, Kieo University Twenty First Century Centre of Excellance)*

As the then Planning Minister I am happy that the Approach Paper to the Ninth Plan introduced the objective of capital account convertibility. It is high time that we redeem that pledge, since all the preconditions set then and re-endorsed since have been redeemed. This would, I believe be *the end*

2. See Das and Dipankar (2000) Using a more stringent standard for irrigation water, this study estimates that in some areas with a high level of urbanisation, only 54% of the groundwater in underlying aquifers shall be fit for use for irrigation. This study was commissioned by IEG as part of the current UNU study.

of the beginning of India's global reform. I could go on, for example on "good governance", which the Planning Commission has highlighted and where I have discussed similar issues in the Bombay University's recent seminar but don't want to test your kindness. As the American folk singer of my generation, Joan Baez, said, "The answer my friend is blowing in the wind." The Planning Commission has started the process. It is our job as a professional society to bring it down to the World. But seriously and with numbers. The World will reward the brave.

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