What should be done about India's stagnant economy

by Ramtanu Maitra

Over the last year the Indian economy has remained "on hold," handicapped by a severe drought in 1987 that ravaged an already-stagnant agricultural sector. But rather than the drought temporarily halting the economy's growth, the fact is that the drought has exposed the glaring deficiences of India's physical economy. Those deficiencies center on lack of infrastructure.

The drought has especially shown the limitations of India's success in managing its vast water resources and generating adequate electrical power—the two pillars on which India's agriculture and industry rest. Failure to harness adequate power and mismanagement of abundant water supplies has kept hundreds of millions of Indian citizens in misery. It is this failure which has defined "two Indias." One is the India of high technology centered in defense and the space program with vast scientific and technological potential. But this India is surrounded by a sea of poverty. Crippled by poverty and lack of basic necessities, a majority of India's rural and urban population remains unhealthy, unskilled, and consequently, only marginally productive. There exists no infrastructural pipeline through which technology is introduced to the economy as a whole. Water, power, education, and transportation are thus key to India's very survival; inadequacy in any one of these areas means a relative crippling of the economy and destruction of labor power.

Tables 1-5 and other available data on infant mortality, per capita public health expenditures, illiteracy, slum population in the cities, etc., show that in spite of loud drumbeatings about building a "socialistic pattern of society," the misery of India's millions has not been alleviated. The so-called poverty ratio at the time of independence was 40% of the 340 million that lived in India then. Today, the poverty ratio is practically the same: While a larger number, about 480 million, are above the so-called poverty line, even more, roughly the entire population of India in 1947, have gone below that arbitrary line during these 40 years.

Even that is grotesquely misleading. Who are these poor? What is "poverty" in India? The poverty line business is worth exploring to understand who is considered poor in India.

According to the Planning Commission, those who earn a monthly income of less than 107 rupees (Rs.) in rural areas and less than Rs.122 in urban areas, at 1984-85 prices (about $9-10), are below the poverty line. The basis of calculation is the alleged minimum caloric requirements of 2,400 per capita per day in rural areas and 2,100 per capita per day in urban areas. This definition means that if a family of five—since the minimum unit for any economic calculation must be the household, and not an individual—living in an urban area earns above Rs.610 per month, such a family is considered to be above the poverty line and its members are not poor. If reality had been the principle for defining the poverty line, it would have been apparent that no family of five can survive with that income.

The concept is phony to begin with, since a family, in order to earn a wage and survive, needs more than the bare minimum of food. The basic requirements associated with earning an income are the following: The family must have a home to live in and pay rent for it; the family must buy cooking gas, or kerosene or firewood to cook its daily food of 2,100 calories; the family must have electricity in order to survive; the family must have water for drinking, sanitation, and washing purposes and pay for it; the family has to buy clothes; the family has to pay to commute to the workplace; the family has to pay for incidentals, vital as they are, such as medicine etc. It is evident all these cannot be done with a monthly income of Rs.610 per month, at 1984-85 prices, for a family of five.

Plenty of water

The current drought has hit India at its two most vulnerable points: water and energy. India depends heavily on the monsoon—a 13-week period which follows the dry season—for its water supply. In a normal year, India receives about 330 million hectare-meters (mhm) of rainwater. After 40 years of government water management efforts, only 20 mhm—not even 10%—is successfully impounded, mostly in big reservoirs. About 150 mhm enters the soil. The rest—fully 160 mhm—flows into the sea, carrying with it an enormous amount of silt.

Over the years, the volume of water that flows into the sea has increased because of depletion of natural forests and vegetative cover—both of which help to slow down the flow of water, allowing the flowing water to enter the ground. Depletion of forest and vegetative cover has also resulted in massive loss of topsoil, the most fertile part of agricultural land.

The water that flows into the sea is carried by large rivers (see **Table 6**). But the flow in these rivers is erratic because of the long dry season and the sudden downpour over just 13 weeks. As a result, only a small percentage of the river water is utilized.

Since independence, India's thrust in water management has centered on building irrigation potential through major and medium irrigation and minor irrigation. Major and medium irrigation includes large reservoirs and canals. Minor irrigation, which refers to everything else, including the exploitation of groundwater, has received decidedly less attention by the water bureaucrats (see **Table 7**).

Vast groundwater, too

Since 150 mhm of water enters the soil in a normal year, there exists on that account alone a vast pool of groundwater reserves. The Seventh Five Year Plan (1985-90) document put the usable potential at 40 mhm, but the Central Groundwater Board repudiated that figure in 1986 and said the "ultimate potential" of groundwater is far greater. It is very difficult to assess what India's groundwater exploitation potential actually is, since the government keeps the figures secret.

But recent findings of large groundwater reservoirs in the states of Rajasthan and Uttar Pradesh (UP) indicate that the real figure could be as high as 80 mhm. And studies by the World Bank, recently corroborated by government oil exploration drilling, indicate that in the upper Gangetic plain, south of the Nepal Himalayas, the volume of groundwater in deep aquifers may be as high as 3,000 mhm. Similar deep groundwater aquifers are suspected to exist also in the Brahmaputra basin.

So far, only 10 mhm of groundwater has been exploited, and that, too, in a haphazard fashion. Recharging of groundwater aquifers has been left almost entirely to natural precipitation. As a result, in areas like Haryana, Punjab, and western UP—the major foodgrain production belt—the water has become saline and brackish in certain areas.

To this day, no comprehensive plan has been chalked out, let alone implemented, for a balanced extraction and recharging of groundwater.

. . . But not a drop to drink

It is not agriculture alone that suffers an inadequate water supply. Irrigation accounts for about 90% of all water consumed in the country. Domestic and industrial uses together account for the remaining 10%. This reflects the fact that India's huge rural population does not consume much water.

As the statistics show, India has not been able to supply its population with safe drinking water and adequate sanitary facilities. Yet, the lack of safe drinking water has a cascading effect on other manpower development investments. For instance, not having access to safe drinking water renders most public health measures useless.

TABLE 1

Extent of electrification in some countries, 1982

Country	Population (millions)	Rural as % of total	Electrified households as % of total
India	766	77	14
Indonesia	167	78	16
Brazil	138	32	56
China	1,072	79	60

Source: W.W. Norton and Co., *State of the World 1987*

TABLE 2

Access to safe drinking water in some countries

(percentage of population)

	Rural		Urban		Total	
Country	1970	1980	1970	1980	1970	1980
India	6	31	60	77	17	41
Egypt	93	64	94	88	93	75
Brazil	28	51	78	80	55	71
Indonesia	1	18	10	40	3	23

Source: World Bank, Social Indicator Data Sheets, June 1985

TABLE 3

Drinking water supply and sanitary facilities

	Population with water supply		Population with sanitary facilities	
	(millions)	(percentage)	(millions)	(percentage)
Urban	115.48	77.8	40.03	26.9
Rural	162.07	30.9	2.8	0.5
All India	277.55	41.3	42.83	6.4

Source: Government of India, *National Master Plan India*

TABLE 4
Poverty ratio

Year	Rural	Urban	All-India
1977–78	51.2	38.2	48.3
1979–80	55.5	42.0	52.4
1983–84*	40.4	28.1	37.4
1984–85*	39.9	27.7	36.9

*Provisional figures

To most of India's rural population, 522 million or so, safe drinking water is a distant dream. According to government statistics, residents of some 90,000 Indian villages have to walk at least a mile or more in order to get to the source of drinking water. Very little is known about the quality of water that they or the residents of the other 480,000 villages get.

The persistent power cut

About 95% of electricity supply capacity in India is publicly owned. Under the 1956 Industrial Policy Resolution, the government took direct responsibility for this basic and strategic sector. In spite of a significant rise in electrical power generation over the decades, the amount of electricity generated is far short of both what is required and what is possible.

A careful look at the rural electrification picture begins to tell why. Although 71.5% of India's villages are electrified, only 14% of India's total households have electricity (see **Table 8**). In order to understand this apparent dichotomy, one has to know that the official government definition of "electrification" is the following: "Even if a single connection is provided to a village, it is considered as electrified."

But a major portion of the population earns less than that considered the minimum and lives below the "poverty line." These people simply cannot afford to do the necessary wiring in their mudhouses or shacks, and therefore remain powerless.

It is not just households that are powerless. This year, because of the drought and agricultural priorities, a large segment of industry has had to do without power for at least a few hours every day. The situation is expected to worsen during the coming dry season, as hydroelectric power generation, upon which the country is significantly dependent, will continue to drop (see **Table 9**).

How badly is industry faring due to lack of power? One press report in February summed it up: In the southern states—Tamil Nadu, Karnataka, Kerala, and Andhra Pradesh—where 66.2% of electricity comes from hydropower, the shortage of power is most deeply felt. In Kerala, since August 1987, a 40% power cut has been in force for high tension and extra-high tension power consumers. Seven hours per day of power cut for all consumers—industrial, agricultural, commercial, and household—was also in force until recently, when it was reduced to three hours per day. Karnataka's high tension power consumers are getting only 20% of their installed requirement. A 40% power cut has been in force in Tamil Nadu since January.

It is not much better in some northern states where agricultural demand has forced power cuts in industry. In Madhya Pradesh, a 30% cut is in force and in Haryana, a wheat-growing state, cuts are more severe. Gujarat and Rajasthan—two other states reeling under the severity of drought—are also going through sustained power cuts. In the eastern part of the country where electrical power is a rarity in any case, industrial enterprises in Orissa and Assam are floundering due to lack of the minimum power supply.

What is required to alleviate the situation is nuclear power. More than 25 years ago, Dr. Homi Bhabha, the founder of India's nuclear power program, and India's first prime minister, Jawaharlal Nehru, had said so, and were planning in that direction. But the Indian nuclear industry—now more than 20 years old and well-pampered—has delivered precious little. In all these years only six small nuclear power plants have been built, two were imported from the United States. To this day, India's nuclear industry has declined to take the responsibility of providing electrical power to a power-starved nation.

The bureaucratic reflex

Water and power are only two of the building blocks whose shortage has made the lives of hundreds of millions of Indians harsh and miserable. Education and housing along with safe drinking water and electrical power provide the foundation for a transformation of India's people. Couple these with transportation and communication, and the productivity of the labor force soars. The problem with the Indian economy is not that improvements have not occurred,

TABLE 5
Indian villages non-accessible by all weather roads

States	Percentage of total villages non-accessible
Punjab	1
Haryana	2
Madhya Pradesh	78
Rajasthan	82
Uttar Pradesh	91
Orissa	97
All-India	70

TABLE 6
Surface water resources (1974)

River basin	Average annual flow (mhm)	Utilizable flow (mhm)	Approximate utilization (mhm)
Indus Basin	7.7	4.6	3.7
Godavari, Krishna, and other east-flowing southern rivers	22.5	19.0	7.3
Ganga Basin	51.0	25.0	8.5
Mahanadi and other east-flowing rivers	12.3	9.1	2.8
West-flowing rivers north of Narmada	2.5	2.0	0.5
Brahmaputra Basin (including Barak)	54.0	2.4	0.5
Narmada and Tapi	6.2	4.9	0.6

but that the majority has remained in miserable conditions and has thus acquired very little capability to enhance their labor power.

For lack of consistent attention to the fundamentals, economic gains will become more vulnerable and policymakers will find themselves increasingly in a fire-fighting mode. The government's response to the drought is a case in point. In a knee-jerk reaction born of political as well as economic considerations, the government has produced an "Action Plan" to raise foodgrain production from last year's low of 135-145 million tons to 175 million tons by 1990, the last year of the Seventh Plan.

Enhancing use of high-yield seed varieties and even bridging the gap between irrigation potential and utilization has been ritually invoked. The Task Force assigned to devise a short-term strategy has identified districts in 14 states where high foodgrain potential can be reached with only minor adjustments here or there.

Government response to the power crisis is even more astonishing. In energy-starved India, a policy of *energy conservation* is being talked up! The Bureau of Industrial Costs and Prices, in its recent report on energy audits of the cement, paper, and aluminum industries, suggested short-term, medium-term, and long-term measures for achieving energy conservation in these sectors.

The Planning Commission, not to be left behind, has also suggested a 15-20 year plan for the commercial energy sector (rather than five-year plan) on the grounds of the long gestation period for power projects. The Commission has also recommended a nationwide energy conservation campaign, energy audit, and suitable incentives for energy conservation.

The draft development program

Let us put to one side, however, the poverty of the Planning Commission's current policy approach. It is essential to work out a developmental program whereby all the households of India will be provided with the minimum necessities. This is the crux of the nation-building approach to planning. What is real and primary is the requirement for physical goods in the form of water, power, food, etc., to be consumed by the members of every household, rural and urban alike.

Looking at the contents of such a "market basket" will enable us to estimate what will be the volume of various basic physical goods that need to be produced, what products in both the upstream and downstream ends of the process are to be prioritized for manufacturing, and where and how the manpower is to be allocated to get the job done.

Since no clear data exists for the number of households in the country, let us say that there are about 160 million households—assuming an average of 5 members per family. Since the program cannot be completed overnight, we must allow for population growth and estimate the market basket for 200 million households.

Food: Considering 2.5 kilograms of foodgrain consumption, including rice, wheat, and legumes, per day as the minimum necessary for a household, the direct consumption of all households will be about 185 million tons. Including other uses, such as processed food, storage for emergency, and loss due to storage and transportation, etc., foodgrain production required for 200 million households will be about 300 million tons—nearly twice the "action plan" target.

Since land area is not unlimited, and needs to be allocated for other urgent purposes such as afforestation, growing oilseeds and other essential agricultural products, fruits and vegetables, fodder for cattle, agro-industrial complexes, etc., the key to meeting the nation's food requirement will be to increase farm productivity dramatically. The single most critical factor in this will be water management. If a comprehensive plan for water is adopted in the Ganga River basin—consisting of Uttar Pradesh, Bihar, West Bengal, and marginally Haryana and Punjab states—India could produce foodgrains for more than 1 billion people from that area

TABLE 7
Irrigation potential and utilization
(millions of hectares)

Item	Ultimate potential	Utilization 1950-51	Utilization 1984-85
Surface water	73.5	16.1	34.3
major and medium	58.5	9.7	25.3
minor	15.0	6.4	9.0
Groundwater	40.0	6.5	26.1

TABLE 8
Villages electrified in India

At the end of	Number (× 1,000)	As % of total villages
1947	2	0.3
1960-61	22	3.8
1970-71	107	18.5
1980-81	273	47.3
1986-87	412	71.5

TABLE 9
Mix of installed generating capacity, 1979

Source	Total MW	% of total capacity
Thermal	15,218	57.0
Nuclear	640	2.4
Hydro	10,831	40.6

Source: Government of India, *Report of the Committee on Power, 1980*

alone. The Ganga basin has more than 50 million hectares of cultivable land. With adequate basin management and modern agricultural methods, more than 250 million tons of foodgrains can be produced there.

Water: The minimum water requirement for a family of five is about 1,000 liters/day. This includes drinking water, and water for washing and sanitation requirements. This amount is about one-third of the average water consumption in the developed nations.

Based on this calculation, the domestic water requirement for 200 million households in India will be about 7.5 mhm annually. The agricultural demand, considering 100 million hectares of land will be subjected to intense, three-crop cultivation annually, will be about 70 mhm. Adding another 15 mhm for industrial and commercial uses, the total requirement for the country will be about 90-95 mhm annually.

India's present water consumption is about 30 mhm, of which agricultural consumption is about 92%. But that does not reflect the real water situation. During a normal monsoon year India receives about 360 mhm of water as precipitation. Of that, about 40 mhm enters the shallow groundwater aquifers while 50 mhm moistens the top soil and 160 mhm flows out unutilized into the sea through many rivers. At least 70 mhm of water needs to be impounded in small, medium, and large reservoirs for the purpose of recharging the groundwater aquifers, domestic water supply, and, if necessary, agricultural activities. These reservoirs can also serve as fisheries, producing cheap protein for the citizenry.

Moreover, India has vast reserves of fresh groundwater, though some of it has been contaminated by incompetent use of groundwater. An informed guess, however, is that India has a reserve of at least 80 mhm in shallow groundwater aquifers strewn all over the country, although the concentrations are in the river basins.

In deep groundwater aquifers, 5,000-7,000 feet deep, along the Himalayan foothills, huge freshwater reservoirs exist. According to a 1986 World Bank report, there exists about 6,000 mhm of groundwater in these deep aquifers in the Upper Gangetic Plains and the Brahmaputra River Basin. About 35 mhm of water enters these deep aquifers annually, pressurizing the aquifers. These aquifers are under such pressure that the water will come out on its own—the artesian well—if a bore hole is dug into these deep aquifers. No pumping will be necessary initially.

These figures show that India has much more water available than she immediately needs. Yet people and cattle alike suffer from water starvation—which causes many deaths due to use of stagnant pools where water-borne bacteria proliferate—only because of what can be most charitably described as criminally incompetent policies.

What is required is holding rainwater to the tune of 70 mhm annually; extracting and recharging groundwater from shallow aquifers; extracting 40-45 mhm from deep aquifers annually, allowing them to be recharged naturally; and diverting the surplus river water from the north and east during monsoon season to the southern rivers. Significant natural recharging will increase automatically with the afforestation of deforested lands and reduction of tilled acreage. Annual water consumption in India can be readily raised to 90-95 mhm with a proper water management plan.

Power: The minimum power requirement of any household will include two electric fans of 0.1 kW rating each and an average illumination of 1 watt/sq.ft. (in the developed nations the average illumination is 3 watt/sq.ft.). Assuming that our five-member household lives in a 500 sq.ft. area, the power requirements will be about 0.75 kW at night. Therefore, the domestic power consumption of India's total households at its peak consumption will be about 150 Gigawatts (1 Gigawatt = 1 million kilowatts).

Since domestic power consumption occurs during that part of the day when industrial, agricultural, and commercial uses are significantly less, it can amount to as much as 30% of total power consumed. Hence, India's power requirement can be estimated at about 450 Gigawatts (GW). Allowing for line loss and generation losses, installed capacity should be no less than 550 GW. In the near future, new technologies such as superconductivity will allow an increase in agricultural and industrial activities with the same amount of generated power because of reduced losses and increased storage potential.

At present, India's installed power capacity is a mere 51

GW, and the official target for the year 2000 is 100 GW! This is patently absurd. It makes sense only if one assumes that, a) rural India does not need any power, and b) industry does not need much power.

What are the elements of a power program that can meet the market basket requirements we have outlined? To determine this, it is necessary to look at fuel sources to generate power. India has a significant amount of coal, some hydroelectric potential, and a huge deposit of nuclear fuel in the form of thorium. So far, India's planners have decided to go along with coal-based power generation and hydroelectrics. However, this policy has proven to be extremely problematic.

The quality of India's coal is extremely poor, so poor in fact, that it would not be considered fit for burning in most countries. The ash and mineral content is very high, making it a poor fuel to burn. As a fuel for power generation in bulk amount coal has other problems. Major coal reserves are concentrated in certain areas, often distant from where the power is required. For instance, in northern India where the population density is highest and the bulk of foodgrains is grown, very little coal is available. It has to be hauled in bulk a long distance every day to the power stations. This puts an inordinate pressure on the country's ancient and creaky railroad system and, as yet nonexistent, waterways. Coal also contains ash which needs to be removed and disposed of in bulk. Ash is acidic in nature and, if not properly disposed of, will come in contact with the groundwater, and pollute the aquifers. Coal-burning is also highly pollutive, releasing harmful nitrogenous and sulfurous oxides along with dust particles into the air. Measures can, admittedly, be undertaken to remove the dust and nitrogenous oxides, albeit at substantial cost.

India's hydroelectric potential, considering mini-hydels, could be as high as 100 GW in the peak season. Besides the fact that most of the country's hydro-potential is concentrated in the northeast and north, the quantity is inadequate. The full potential must be exploited, certainly. But hydroelectric has other problems, such as its seasonal nature, that make it unreliable. In order to utilize the full potential of hydroelectrics, balancing reservoirs must be built to which the water will be pumped during the slack power consumption part of the day and used to generate power during the peak demand part of the day.

It's not really debatable: India's power program must be based on nuclear power as the mainstay. Breeder reactors—already developed in India—and a new generation of advanced reactors which are intrinsically safe will be the main sources of power generation until such time as a superior technology such as fusion power becomes commercially viable.

Point of departure

Developing the market basket requirements in basic detail provides a handle to calculate what types of industries and agricultural products are to be prioritized. It also provides a window through which we can see broadly the volume of basic agro-industrial products that would need to be produced in order to meet the domestic as well as industrial requirements. The production capacities of each basic industry—such as steel, aluminium, specialty steel, cement, fertilizer, engineering—to manufacture the basic industrial ingredients to further the agro-industrial development process can also be estimated. Water use and power consumption will define the quality of housing required, while quantity of housing required will enable India to explore new materials, such as aluminium and petrochemical products. And through this process, it is possible to pinpoint the employment potential, during and after the implementation of the program, quantitatively, and also qualitatively. One can, thus, roughly determine the size of the manpower needed, the skills that the manpower requires, and the quality of education to impart these skills.

There are a set of broad but specific economic policy measures needed necessary to achieve the goals defined by India's market-basket requirements. These policies must be adopted on a priority basis, and must be seen to supersede existing policies and programs for basic development work.

1) Agro-industrial development. Dramatically raising

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An 'Untouchable' in India. For a household to earn a wage and survive, it needs much more than the income officially defined as above the poverty line.

general agricultural productivity has to be the government's first concern, and this must mean a focus on farm productivity per se, as well as on the rural economy broadly. Here, the promotion of agro-industries is critical, both to solve the marketing problem that will otherwise undermine real productivity increases, and to absorb underemployed and unemployed agricultural laborers.

2) Infrastructure. It must also be a primary concern of government to build the infrastructure of the country—including power generation, water management, transportation and communication. In general this can be done through appropriately designed large projects, conceived of simultaneously as training centers for construction labor, and relying on a mixture of labor-intensive and high-technology inputs. Primary education facilities must be integrated into the plan. Such large projects can thus, in addition to absorbing labor productively, be a training ground for the workers and their children.

Two types of such projects are particularly timely. First, building nuclear power-based agro-industrial complexes where power will be consumed locally for agricultural and industrial uses (thus obviating the costly investment associated with long-distance transmission). New cities will be built up around such complexes to provide manpower for their operation and growth. Second, water resource policy must serve to bring about the development of river basins as integrated units. This must be complemented by action to link the northern and southern river systems, and to open up waterways—deep channels—through existing rivers for bulk transport by barge, the most efficient and cheapest way to move heavy bulk items. From both the environmental and economic standpoint, failure to apply this approach to the Ganga river basin, the Brahmaputra basin, the Godavari, and others will exact an enormous price.

Neither of these ideas is new. The proposal to develop nuclear power-based agro-industrial complexes, called "nuplexes," was first put forward by Dr. Vikram Sarabhai, and extensive feasibility work was done to map out several such complexes for Uttar Pradesh and Madyha Pradesh. The proposal was buried, however, in the mid-1960s as the agricultural and other crises began to push policymakers into a corner. Articulate critics of India's water management policies have been writing and talking for several decades, but so far their voices have fallen on ears deafened by vested interest and political patronage.

3) Rapid Development of Border Areas. The counterproductive idea that border areas would be kept secure by keeping them underdeveloped has to be abandoned. In fact, only implementing a real and vigorous development process in an area will assure its stability, strength, and integrity with the rest of the country. Therefore, accelerated development of border areas, including industrialization of Punjab and the agro-industrial development of northeast India, is imperative as a priority in its own right.