Revitalising the Agriculture Sector in India

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Restructuring the agriculture sector in India is long overdue to make it highly profitable, reliable and dependable primary sector for higher growth rate, employment generation in rural areas and to stop farmer suicides.

There is an abysmal disorder in the agriculture sector on account of multiple factors. The government's apathy towards the farm sector is never-ending, which has led to the present situation where we have to depend heavily on imports of vegetable oils worth 74,000 crores, fruits worth 15,000 crores, pulses worth 12,000 crores during 2020-21. The input costs have overshot the returns in the farm sector. Farmers are unable to meet the rising input costs year after year with dwindling returns on farm yields. Farm incomes are decreasing and loan burden is increasing. The government is merely relying on temporary solutions in the form of hiking MSP prices grossly disproportionate to input costs, insufficient farm subsidies, and inadequate marketing facilities, scanty compensations for crop losses due to either floods or famine. If India was to achieve self-sufficiency in all types of food commodities, the central government should immediately focus on a complete overhaul of the farm sector to remove the malaise that is entrenched deeper inside, eating into the vitals before it is too late to repair the damage.

In this scenario, this paper suggests concrete measures the government should take to increase the agricultural production at the lowest input cost so that farmers get maximum profits; for modernising procurement, storage and distribution network with greater efficiency; to inform and help farmers sell the produce at the best price using technology, to gather real time virtual data of all crops being cultivated, the crop yields on regular day to day basis thus arriving at their availability according to each village, district and states, and to evolve a single national agriculture market for selling; promoting and supporting area specific crops and vegetables linked to ever changing food habits and consumption by the people.

Route map to modernising and streamlining the agriculture sector in the country to achieve the following objectives

1. To double the agricultural production from the present level and achieve self-sufficiency in all food commodities and achieve 150% of actual consumption in India so that the remaining 50% can be exported or can be stored as buffer stock in the aftermath of famines or other unforeseen natural calamities.
2. To stop farmer suicides by increasing incomes
3. To generate rural employment and stop migration of people to urban areas
4. To modernise agriculture practices, harvesting technologies, marketing structure, procurement, storage facilities and public distribution system
5. To make every district of India self-sufficiency in food grain production in 80% of crops, each state in 90% of crops and country as a whole in 100 % of crops

6. To avoid cross-transportation of agricultural produce and thus reduce transport cost of agricultural produce. It benefits both farmers and consumers
7. To decrease farming input costs and increase minimum support price for all agriculture produce.
8. To gradually reduce dependence on chemical fertilisers and pesticides, and instead promote organic farming by using natural manures and pest control methods.
9. To ensure allocation of all agriculture subsidies only to **real farmers** and keep rich farmers away from subsidies.
10. To achieve food security, energy security and fodder security
11. To overcome hardships from monsoon failures and frequent floods with advanced water resources management on the ground and by using satellite technology
12. To provide marketing facilities for all agricultural produce
13. To create efficient mechanism to sanction insurance for damaged crops due to floods, famines, drought and cyclones.

Enriching the farmer should be the government's first priority

A] Decrease the farm input cost through subsidies **1-year, short-term plan**
B] Involve farmers in the solar energy sector – **3-year medium term plan**
C] Water resources management – **10 year long term plan**
Water resources management is designed to provide water supply to every acre of land for 365 days without depending on ground water.

One-year Short-Term Planning

Short-term plans can be initiated and completed within one year to stop farmer suicides across the country.
One-year, short-term plan includes providing entire farm input costs for all crops to small, marginal and medium farmers and keep away all rich farmers from getting any subsidies.
The Central government should take immediate measures to decrease the farm input cost through subsidies.
The rising input costs in agriculture are on three entities- Material [seeds, fertilizers and pesticides], manpower, and machinery.
1. The government should give 80% subsidy on seeds and fertilizers to **real farmers/full-time farmers**. Who are **real farmers/full time farmers**? I will explain in this paper.
2. The government should give 50% subsidies on machinery like tractors, tractor spare parts, rotavators, sprayers, harvesting machines, paddy transplanting machines, all farm equipment, sugar-cane crushers, tarpaulins, oil mills, flour mills, farm implements, etc., to **full-time farmers** only.
3. The government should give loans to all farm-related machinery and equipment, at annual interest rate of 4%, to **full time farmers**.

4. The government should link NREGS scheme with the farm sector. Employment generation for rural farm workers should be allotted to **full time farmers**. The daily payments to rural farm workers who work or assist **full time farmers** should be paid by the government under NREGS scheme.
5. The government should pay full input cost to all crops raised by small and marginal farmers who are **full time farmers**
6. The government should give top priority **to full time farmers** in procurement of cereals. It should give an additional 10% higher Minimum Support Price as bonus to **full time farmers** who produce cereals, pulses and oil seeds.
7. Tractors, which transport agriculture produce, should be exempted from all toll fees in the entire country.

1. Segregate farmers into two categories, **real farmers** and **rich farmers,** so that all agricultural subsidies can be allocated to **real farmers**. 99% of farmers who are committing suicides in India are **real farmers/full time farmers** who do not have other sources of income other than agricultural income.

Broad definition of Real farmers/full time farmers/regular farmers

Real farmers or **full-time farmers,** are those who depend solely on agriculture income and do not have other sources of income through business, industry, professional skills, rentals, pensions, etc. Both husband and wife should be taken as one unit for providing agriculture subsidies. Both of them should not have any other source of income other than agriculture income for their livelihood. These are real farmers or prime farmers. Exclusive rights on all agricultural subsidies, farm loans, compensations should be given to prime/full time farmers. Loan waivers should be applicable only to real/full time farmers. Clear and unambiguous guidelines should be framed to keep non-regular, non-prime farmers out of all forms of farm subsidies, loan waivers, compensations for crop loss and exemptions from income tax.

The plight of the genuine farmers in the country is primarily due to mismatch between farming input costs and farm yield incomes. The subsidies that the government provides to farmers in various forms are utterly inadequate to meet the ever rising input costs. Most of the subsidies that the government distributes to farmers are gobbled up by rich farmers who have other sources of income through various professions or secured jobs both in the private and government sector. This group of part time or non-regular farmers should be declared as non-prime farmers and kept out of all farm subsidies.

What the small, marginal and medium farmers get is a very paltry share of the amount from all subsidies to survive in the agriculture sector. The government should allocate the entire amount of all subsidies to only real/prime farmers who depend mainly on cultivation and do not have any other source of income. The industrialists, contractors, business-class, government employees, professionals, political leaders and other people whose annual income is more than 6,00,000

rupees should be declared as non-prime farmers, although they own lands and practice cultivation.

According to my thinking **Rich farmers** are those who have other sources of income through business, industry or other professions and those farmers who are also central and state government employees, political representatives, political leaders, pensioners, celebrities and all those farmers, whose annual income is more than 6,00,000 per annum other than the agriculture income, should be categorised as rich farmers. Both husband and wife should be taken as one unit for providing agriculture subsidies.

2. Upon categorisation of farmers, the government should provide the entire input cost of crops [cereals, pulses, vegetables, oil seeds and some commercial crops like sugarcane to genuine small, marginal and medium farmers, leaving all **rich farmers** as categorised above.

Prime/full time farmers deserve special rights and privileges to keep agriculture vibrant and as vanguard to the industrial sector and service sector. Although agriculture and allied sector shares around 20% in GDP value, it is a crucial and essential primary sector to act as a growth engine to haul secondary and tertiary sectors.

To provide total input cost for all cereals, pulses, vegetables and pulses to all **real farmers/full time farmers,** the Central and State governments should have complete and accurate daily wise status data of all crops that are being cultivated in the entire country.

Steps to be taken for taking accurate daily crop details across the country

1. Coding of all agriculture crops
2. Establishing data collection machinery necessary for field work
3. Creating Land Savings Accounts for farmers and land crop schedules
4. Integrating data collection with subsidies and support prices

1. Standard coding for agriculture crops

The government should give standard codes to all crops that are being cultivated in the country. The coding of crops is essential to get the accurate data of all crops that are being cultivated according to village-wise, block-wise, district-wise and state-wise on daily basis so that Central and State governments will have full details of all crops with exact stage, status and extent of each crop that is under cultivation on each day. This will help both the State and Central government to provide input costs to all **real farmers/full time farmers** in regular and timely instalments according to the crops they raise, the stage and status of each crop.

Here is an example of coding some crops, as illustrated below.

Cereals – Rice - C 01, Wheat - C 02, Maize - C 03, Sorghum - C 04 Finger Millet - C 05, Fox tail Millet - C 06 Little Millet - C O7 Pearl Millet - C 08 Barley - C 09, Oats - C 10

Pulses – Red gram - P 01, Black gram - P 02, Pigeon Pea – P 03; Chick pea - P 04; Cow pea - P 05; Sago - P 06; Red Lentil - P 07; Horse gram - P 08; Bengal Gram - P 09; Chickpea – P 10; Soya beans – P 11

Oil seeds – Groundnut - OS 01; Mustard – OS 02; Sesame - OS 03; Castor seed - OS 04; Linseed - OS 05; Sunflower - OS 06; Safflower - OS 07; Niger seed - OS 08; Palm oil - OS 09

Vegetables – Onion - V 01; Potato - V 02; Tomato - V 03; Brinjal - V 04; Carrot - V 05; Cabbage - V 06; Capsicum - V 07; Chillies - V 08; Beans - V 09; Ridge Gourd - V 10; Bottle Gourd - V 11; Pumpkin - V 12; Ash Gourd - V 13 , Cauliflower - V 14

Commercial crops – Sugar cane - D 01; Cotton - D 02; Coconuts - D 03; Cashew nuts - D 04; Jute - D 05; Coffee - D 06; Tea - D 07; Tobacco - D 08; Rubber - D 09; Casuarina – D10; Eucalyptus – D11; Teak – D12; Cassava – D 13; Bamboo – D 14

Fruits – Mango - F 01; Banana - F 02; Guava - F 03 Papaya - F 04; Orange - F 05; Apple - F 06; Grapes - F 07; Pomegranate - F 08; Lemon - F 09; Pine apple - F 10; Watermelon - F 11; Sapodilla - F 12; Dates - F 13; Custard apple - F 14; Rose apple - F 15; Jack fruit - F 16; cucumber – F 17

Flowers --- Marigold – B 01; Rose – B 02; Jasmine – B 03; Chrysanthemum – B 04; Hibiscus – B-04; Oleander – B 05; Crossandra – B 06; Night flowering jasmine – B 07; Butterfly gardenia – B 08; Lily – B 09; Michelia - B 10; Dahlia – B11; Tulips – B 12; Saffron – B 13

Spices – Turmeric - S 01; Ginger - S 02; Cardamom - S 03; White pepper - S 04; Black Pepper - S 05; Asafoetida - S 06; Cloves - S 07; Cumin Seed - S 08; Fenugreek - S 09; Garlic - S 10; Nutmeg - S 11; Tamarind - S 12; Saffron - S 13; Fennel Seed - S 14

Animal Husbandry – Cow – AH 1; Ox – AH 2; Male buffalo – AH 3; Female buffalo – AH 4; Goat – AH 5; Sheep – AH 6; Deer – AH 7; Donkey – AH 8; Horse – AH 9; Camel – AH 10; Pig – AH 11

These standard crop codes are absolutely necessary for crop data collections and agriculture apps usage. It will become easy for data collectors, agriculture policy makers and ministry of statistics and programme implementation. These codes will be useful to get area-wise virtual and real-time crops status at various stages. The total area of each crop under cultivation in the entire country will be known on each day.

2. Establishing data collection machinery necessary for field work

High and efficient field network is the primary requisite for mitigating farm distress and agrarian crisis that is visible by its havoc throughout the country.

Employees needed for the field data collection from ground work

One **field assistant** is required for 500 acres for collecting crop data on regular a basis every fortnight. This 500 acre is called **domain** with unique code number

Total agriculture land in India is 35 crore acres approximately. It has to be divided into 7,00,000 **domains** with code numbers

Total field assistants needed – 7,00,000

For every 10 field assistants, there should be one land supervisor at block level

Total land supervisors needed 70,000

These field assistants or data collectors, shall be recruited by the state government at monthly salary of 15,000 and land supervisors at the monthly salary of 20000

Salary bill for the data collection and entry into national agriculture database is 700000 x 15000 x 12 = 12600 crore per annum

The annual salary bill for land supervisors is 70000 x 20000 x 12 = 1680 crores

Total salary bill for data collection = 12600 + 1680 = 14280

Half of this amount should be borne by the Central government. The remaining half of the salary bill, that is 7140 crores, shall be endured by all state governments of India, according to the number of data entry operators in the respective states. Each state's share on this nation-wide data collections will be around 400 crores [average]

The minimum qualification required for these data collectors is 10 + 2 with one month training on data collection and data entry into national databases using smartphones/tabs/laptops with installed, exclusive software provided by the central government.

Job description – Each data collector is assigned a **domain** with a code number comprising 500 acres for data collection pertaining to various crops and data entry into national agriculture data base developed for crops, pisciculture, animal husbandry and poultry

Method of data collection – After recruitment and giving one month training, the data collectors shall be entrusted with data collection job at field level. They visit agriculture fields of farmers and collect data like stage, status and condition pertaining to various crops that are raised in 500 acres of land and should be completed in 15 days at the rate of 40 acres per day. This data collection on crops and land usage shall be collected regularly within 15 days for each cycle throughout the year. There will be 24 cycles for crop data collection per year. Thus, complete and exact status of all crops, at various stages will be updated for every 15 days and available at the national agriculture database for central and state governments, farmers and policy makers. This data will make it easy for the central and state government to transfer subsidy amounts to farmer accounts at regular intervals based on the types and stage of crops they raise. This data collection will be more useful when crops are damaged due to floods or lack of rains due to monsoon failure. The farmers will get instant compensations when crop failures occur due to floods or other calamities.

How the crop data is collected and entered is explained here

The **crop data collectors** or **field assistant**s should be provided with tabs with installed apps for data entries into the national agriculture database. These apps should be fingerprint, username and password based login. Each data collector will have to open the app with user name and password. Then they have to operate and enter data after successful fingerprint login.

The interface of the app for collecting crops database

Once the data collector logged into the app with fingerprint, it shows the land survey numbers [500 acres area] in his **domain**. He can only register data of crops or orchards/fruit gardens raised on this 500-acre **domain** area. Thus, each data collector will have access to enter data on crops raised on this assigned **domain** area only [500 acres area assigned to him]. When the field data collector visits his **domain** area, he has to enter the crops' details raised by farmers in each land survey number. The app shows him the survey numbers. He has to select survey number or land Id number.

The app in his cell phone/tab shows like this. It shows the **Cycle** and **domain** name with its code number. There will be 24 **cycles**. The present cycle will be automatically displayed corresponding to the date in the app. He need not select **cycle**. If he clicks on the **domain** name it shows all survey numbers/land Id numbers in his domain. When he clicks on a particular survey number/land Id number, a dialog box opens up which shows like this. This is an example of the data entry template on his phone/ tab. He does not need to bother about who owns the land or who cultivates the land. His only assignment is to record the crops raised in each survey number in the domain area he was assigned with.

Example of data entry -- Survey No -1 Total extent – 397 cents

Area in cents	Crop	Stage	Land usage
038	C 01	2	
120	D 02	1	
100			13
139	F 03		7

If there is only one crop in the entire land in that survey number then he enters the entire area in the first column and **code** of the crop in the second column and then stage in the third column. Standard codes for each crop are given at national level by the agriculture ministry.

When different crops are raised in the same survey number, he has to enter each crop area, its code and its stage in each row. But the total area of different crops does not exceed the total area of that survey number/land Id number. His job is as simple as that.

The status of crop and land usage is coded into 13 categories 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

Crop status

When the land is vacant, it is given code 0

When the seeds are sown and sprouted, it is given code 1

When the crop is in middle stage, it is given code 2

When the crop is ready for harvesting, it is given code 3

When the crop is harvested, it is given code 4

When the crop is submerged due to floods, it is given code 5

When the crop is withered due to lack of rains, it is given code 6

Land usage

When the land is used for fruit gardens or orchards, it is given code 7 under land usage
When the land is used for aqua pond, it is given code 8 **under land usage**
When the land is used for poultry, it is given code **9 under land usage**
When the land is used for dairy, it is given code **10 under land usage.**
When the land is used for salt production, it is given code **11** under land usage
When the land is converted into plots/house/ apartment, it is given code 12 under land usage
When the land is converted into industry usage, it is given code 13 **under land** usage.

Once he completes one survey number, he moves onto the next survey number. The crop status data is updated instantly at the block-level, district level, state level and central-level agriculture department offices. If there is no internet connectivity on the fields, the data is saved during the data collection process and can be uploaded when he gets to the internet connectivity at the end of each day.

He has to complete all survey numbers in his domain area within 15 days. Then he repeats the same process once again in the next **cycle** of 15 days. There will be 24 such cycles during one year. The inspection and data entry in every domain area is twice per month. With daily collected data updated from all **field assistants/crop data collectors** across the country, the up-to date status data of all crops in the entire agriculture land of 35 crore acres will be available on the the central and state websites for every 15 days throughout the year. This data is very crucial and precious for helping farmers provide, subsidies, seeds, fertilizers, farm inputs, crop loans, compensations, insurance payments, etc. Out of a total area of 35 [approximately] crore agriculture lands 30% lands contain long term or multi- seasonal crops like mangoes, apples, teak, coconut, cashew trees, etc. So the **field assistants** or **crop data collectors,** will need to visit these long term crops only twice, at six months intervals during one year, to check whether the long-term crops exist or are replaced with short-term crops.
So the **field assistants** or **crop data collectors** will have to visit the lands where short term crops are cultivated at a 15-day-**cycle** period. On an average, a **field assistant** or **crop data collector** visits 300 acres of land in a 15- day-cycle period, but he visits 200 acres of lands where long term crops are grown only twice during one year.
On an average a **field assistant** or **crop data collector** visits 30 acres per day to get data collection on crops and land usage. The lands where short-term crops are raised will be visited 24 times during one year to get real, accurate, exact and updated crops status data for every 15 days.

One domain area of 500 acres is to be assigned to **field assistant/data collector.** One **field supervisor** will monitor the functioning of 10 field data collectors. The block-level officers in the existing agriculture departments will monitor the field supervisors and field assistants/crop data collectors.

The next-level database centres are located at existing agriculture departments in district, state and central headquarters. The daily crop data collection and entry into the **Agro App** by field assistants will pass through **block level** to **state level** to **central agriculture office**. No additional establishment is required at block, district, state and centre level for gathering this huge crop data, freshly collected for every 15 days from the entire agriculture land of 35 crore acres in India. The existing agriculture departments of all states and the centre can handle, monitor and assimilate the regular data being collected from the field data collectors. Thus, the entire agriculture crops data of all states will be updated and available at the Central agriculture ministry database and website. That means the newly created army of **field data collectors** and **field supervisors** will be an appendage to the already existing agriculture department of states.

Every farmer will get his land details and crops status from the district and state websites to check whether data is exactly the same with the crops raised on his/her lands. Every farmer will have his/her land and crop schedule with personal land account on the government's agriculture website containing the various crops he raises as recorded and sent by the **field data collector**. The farmer's land schedule will have the land records he owns anywhere in the country, with all crops he raises and subsidies that are eligible to get. If there is any discrepancy found in the scheduled data, then he can complain to the Field supervisor through toll-free number. The Field supervisor will have to personally visit and check the farmer's lands to know whether the **field data collector** has erroneously sent wrong data. If it is found to be the wrong entry, then he can change the crop status correctly. The field data collector will get one warning for his mistake. If the field data collector makes three consecutive mistakes in 3 cycles of data collection, he should be immediately removed from the job. The field data collector can enter data into the app and he cannot change it once uploaded. If there is any error by mistake in the sent data, it has to be corrected by the field supervisor upon proper explanation by **field data collector.** The entire data of all crops for all years and all seasons will be available individually for farmers and collectively for agriculture departments, agriculture scientists, and agriculture university and college students.

This data will be useful for state agriculture departments to know the exact requirements of seeds, fertilizers and farm equipment for farmers according to village-wise, block-wise and state-wise, so that they can supply all these essential items to every farmer at the right time and in sufficient quantity. This data will also hugely help agriculture scientists in their research on various crops and in creating new varieties that are suitable to various regions, soil types and different climatic conditions.

Centre and State governments should run their respective websites for broadcasting day-to-day live agriculture data as obtained directly from field assistants/crop data collectors across the country. Huge electronic display boards are to be installed at agriculture department offices at the block, district, State

and Centre level to display live data pertaining to respective level received from field data collectors working simultaneously across the country.
When the field data collectors across the country enter details about crops and stages in prescribed codes, this data will be reflected in the cumulative values of all crops in acres at different stages at block level, district level, state level and central level electronic digital screens. The possible yields of all agriculture produce in the entire country can be extracted from this huge data of all crops obtained from field data collectors across the county at every 15-day-**cycle** of data collections. This will give huge leverage for the Central government to give permission to export agriculture produces, which are expected to cross domestic demand and plan for imports of items which are going to be short of demand. The government can also give more incentives for farmers in the next season to raise the crops, which failed to meet domestic demand sufficiently in the present season to avoid imports in the next season.

Land Savings Account to empower farmer

The Central government should give one Land Savings Account to each farmer. This land savings account will have digital property rights of all his land holdings bought anywhere in the country. The central government should give one Land Savings Account to every citizen of India. It should be made mandatory for any person to buy or sell lands, plots, flats or houses through this land saving account only. The ownership rights of all immovable properties are recorded in the digital form in Land Savings. The Central government should run a nationwide Land Bank. This national land bank will have all immovable property owners as its customers. The ownership rights of all immovable properties, like agriculture lands, industrial lands, government lands, forest lands, temple lands, trust lands, plots, flats and commercial establishments, are recorded digitally in the respective owners' Land Savings Account. The ownership rights will be transferred from one Land Savings Account to another Land Savings Account when people buy or sell lands or other properties. The cumulative land area in all Land Savings Accounts should be always the same at any time. But the number of properties like flats, houses, commercial establishments will increase everyday. All branches of national banks will maintain and operate these Land Savings Accounts. Buying and selling of all immovable properties should be made through these Land Savings Account at any bank branch in India.

What is a Land Savings Account and what are its benefits. This is a part of my Digital India Project, developed to make India the super economic power of the world. This paper was available on the internet by searching with--- Digital India Project by Vijaya Varma, ResearchGate

Vivid explanation: - Land Savings Account/LSA In my suggested TOP Tax system for Digital India Project the Land Savings Account of each person shall be utilised as

the de-mat account of that person's ownership rights of all immovable properties like lands, plots, flats, assets, factories and other establishments purchased anywhere in the entire country. While purchasing or selling the transfer of ownership rights of these assets/properties from one person to another person shall be made from one person's LSA to another person's LSA through banks/service centres. So, the transfer of assets like lands, plots, flats, structures and other establishments, will take place in physical form, upon the transfer of ownership rights of that asset, in digital form, from one LSA (seller) to another LSA (buyer). The TOP Tax system suggests that the total land record of the country should be digitalised according to extent, location, and ownership. The land belonging to people will be recorded in their respective LSAs. Similarly, the land that belongs to Government, Government organisations, companies should be recorded in their respective accounts.

I repeat for better understanding; - Under the TOP tax system, the purchase of lands, plots, flats or other properties should be made through Land Savings Account (LCA), the sub-account of Main Savings Account (MSA) operated by banks. If any person buys land, plot, flat or any other immovable property anywhere in India, the extent and nature of the property will be credited in his Land Savings Account and the same property will be debited from the seller' Land Savings Account (LSA). Whenever he/she sells any property in his LSA, the property will be debited from his/her Land Savings Account and the same property will be credited in the buyer's Land Savings Account (LSA). The credit in the LSA means purchase of immovable property and debit means selling of immovable property. The immovable properties will be in dematerialised form and the ownership rights can be transferred from one account to another account, just like money transfers and shares. Just like shares, there will be no paper documents for properties. Unlike cash transfers, the buyer's presence and signature/authentication shall also be needed for any property transaction.

How the land ownership rights are transferred

The land Savings accounts are always closed accounts. They are open only when account holders log into their accounts by username, password and fingerprint approval. Even bank officials cannot open these accounts without the account holder's permission.

1. Both the seller and buyer should go to a bank branch
2. Both the seller and buyer will have to give a signed, single transaction form, just like a money transfer form, with the details of the property that is to be transferred.
3. Both the seller and buyer will have to open their respective Land Savings Account with fingerprint login.
4. Then, the bank manager will transfer the property from the seller's Land Savings Account to Buyer's Land Savings Account.
5. The bank manager should complete this transaction within 5 minutes of opening the two Land Savings Accounts. Then, the two accounts will be automatically closed.

6. If the Bank manager does not finish the transaction within 5 minutes, the two accounts will be automatically closed. Then, the buyer and seller need to login to their respective LSA accounts once again to enable the manager to finish the transaction.

7. Only a single property transaction can be done at one time. For multiple transactions, both buyer and seller need to login to their accounts for every property transaction.

A bank statement of the Land Savings Account (LSA) of any person's Main Savings Account will hold the entire ownership rights of that person's all immovable properties in the entire country. The People can get these bank statements of their properties at any time at bank branches in addition to weekly, monthly or yearly statements. The account holder needs to go to the bank branch personally for property statements. He can also view and check his property record through online login by username, password, OTP and fingerprint/face recognition. They will get phone messages and email statements immediately after each property transfer.

There will be no multiple selling of the same property to different people and unauthorised selling/purchase and illegal occupation of other person's property without his/her knowing/consent will not be possible.

Advantages of Land Savings Account/LSA:-

1. Land ceiling act

In the present system, rich people are having huge tracts of agricultural lands in different districts and States, making mockery of the land ceiling act. The registrations of lands, flats, plots and other properties are being made by the registration departments and land records are maintained by the revenue departments.

In the TOP Tax system land ceiling act can be strictly enforced on individuals and no individual can have more than 20 acres of land in the entire country. Every individual will have only one **Land Savings Account** for all immovable properties like lands, plots, flats, etc., All immovable properties, situated wherever in the country, along with all details of Survey numbers, boundaries, description, nature, map, geo location, village, district, state, extent and date of selling/buying of property by each person will be recorded and maintained in Land Savings Account (LCA).

The Land Savings Account will be operated and maintained by banks, just like money savings accounts. Debits and Credits of all properties will be made in the Land Savings Account while a person buys or sells his property. The total extent of land recorded in all Land Savings Accounts belonging to people, Governments, departments, organisations, companies, institutions, etc., will remain exactly the same even after countless number of debits and credits each day. The Land Savings Account will show an individual's exact ownership rights of his/her all immovable properties. The total land extent in each Land Savings Account will never cross the upper limit of 20 acres (as envisaged in TOP Tax system), strictly adhering to land ceiling act. There can be absolutely no multiple selling of the same property to different people. It will become impossible for any individual to own a huge extent of lands (beyond land ceiling act) under different names in different locations of the

country. The TOP Tax system ensures that the land ceiling act can be implemented in totality to perfection, making the Government's task easier in pushing forward land reforms and allocating land to landless poor.

There will be no paper documents for all movable and immovable properties. Hence, no separate registration and revenues departments are needed in the suggested TOP Tax system. Only the land survey department would suffice to mark and clear boundary disputes.

2. Farm subsidies; - In the present system, 60% of total farm subsidies are being gobbled up by rich farmers (10%), while the small and marginal farmers (90%) are getting only 40% of total farm subsidies. This anomaly can be totally checked in the TOP Tax system where Land Savings Account is a sub-account of Main Savings Account operated by banks. According to records in Land Savings Accounts, the total farm subsidies (100%) would reach the small, marginal and medium farmers while keeping away rich farmers from all subsidies. Here, rich farmers means industrialists, contractors, professionals, celebrities, individuals, politicians, business-class, salaried class (govt or private) etc., whose annual incomes are more than 6,00,000 (other than agriculture income).

3. Farm loans; - In the present system, getting farm loans by farmers is cumbersome, laborious, time consuming and bribery-ridden exercise. Farmers need to go from one department to another department to get land documents, evaluation and encumbrance certificates, revenue certificates, etc., after paying heavy bribes. Farmers are being forced to take loans from private lenders who charge high interest rates.

But the Land Savings Account will make money borrowing by farmers from banks so much easier, instant, smooth, timely and time saving exercise. By using Land Savings Accounts, the branch managers can sanction farm loans instantly based on land records in the LCAs.

4. Interest rates on farm loans

In the suggested TOP Tax system, the interest rates on farm loans up to Rs.10, 000, 00, will be only 3% per annum and 4% per annum beyond Rs. 10,000,00.

5. Land acquisition and compensation;- If an individual or company acquires land of more than 20 acres of land for industry, studios, real estate or any other purpose, land tax of 10,000 per acre per annum needs to be levied. If land is acquired for SEZs the farmers should be paid not only the market price of the land but also Rs 1,000 per acre per month for rest of his/her life and thereafter to his/her legal heir. It is easier for local panchayats, municipalities, corporations to collect house tax, vacant plot/land tax and properties tax as all the details of a person's properties are recorded in his/her Land Savings Account (LSA).

6. Land transfer/registration/stamp duty;- Under the "TOP Tax system" there will be no stamp duties on all immovable properties The registration charges for purchasing any property i.e. land, plot, flat, house or other commercial establishments will be same and equal all over India irrespective of the place and market value of property. The registration charges would be only Rs 1,000 per acre, Rs 1,000 per 300 square yards of plot or Rs 1,000 per 1000 square feet of flat and multiples thereof. These

land transfers can be made in any bank and anywhere in India. It is needless to say that the loss of stamp duties would be compensated by the "TOP Tax" which is compulsory on any money transfers. If a person buys a property (land, plot, flat, house, commercial establishment) for Rs 10 lakhs, a TOP tax of Rs 40,000 will be deducted from his MSA or SSA while transferring the cash to the sellers account. If he/she buys the same property for Rs. 1 crore the deducted TOP tax will be Rs 4 lakhs. In the case a person transfers a property as a gift to his/her son/daughter or any other person, trust or organisation the TOP tax deducted will be nil, as there is no cash transfer made. That means there will be no need for separate registration and revenue departments for registrations and handling of all immovable properties.

Digitalisation of land area and land records

The entire land area of the country should be digitalised

Land area digitalisation –

Digitalization of land area and land records - This is an example of land digitalization module. India land area is equal to 32, 87, 264 square km=82 crore acres approximately. I propose that this entire land area be divided into 1,64,000 blocks, with each block having around 5,000 acres. This block area should be divided into approximately 5,000 units, with each unit = 1 acre area as shown in this model image. This each unit [1 acre] should be given an 11-digit unique land Id number. For example – 12345670001, the first two digits indicate State. The next two digits indicate district code. The next three digits indicate the block. The last four digits indicate the unit number in the block. This land, with Id number 12345670001, reveals the exact location of the land unit [1 acre] and the extent in acres, cents, yards and feet. If this one-acre unit is owned by many persons, the unit [1 acre] can be noted in 0001/001 up to 0001/100. That means this unit, 0001 [1 acre] is owned by many persons as plots or flats. Each person should be given a land savings account. This land savings account can be used to store property rights of a person's immovable properties, bought anywhere in the country, in digital forms. The entire land area of the country should be recorded in these accounts belonging to persons, government, organisations, trusts, institutions, companies, etc., in their respective land savings accounts. Selling and buying of land properties should be done by this account only. There will be only one Land Savings Account for one person to buy any immovable property anywhere in India. Land units where buildings like homes, apartments, factories, bungalows, cinema halls, studios, shopping malls, etc. are constructed on these units should be characterised with code letters.

For example, if the unique id number is

A12345670001 is agricultural land

C12345670001 is commercial land [shops, studios, malls, etc.]

G12345670001 is Government land

F12345670001 is Forest land

H12345670001 is plots, flats, housing, apartments, bungalows, etc. for dwelling
T12345670001 is the temple land
M12345670001 is industry land
O12345670001 is organisation, trust or institution-land
R12345670001 Rivers land
W12345670001 water bodies like ponds, lakes, reservoirs belonging to Govt.
R12345670001 Railways land
So there will be 82 crore land units of each 1 acre area that segregated into different usages.
These entire land units are recorded in the land savings accounts belonging to respective owners. The banks will handle all these accounts
So the banks will transfer the ownership rights or these properties from one land savings account to another land savings account when people buy or sell these properties
The entire land area recorded in all these accounts should always remain the same at all times. But the number of properties built on this land may increase every day with the registrations of newly constructed apartments, buildings, etc.
The ownership rights are fully determined and there will be no chance for legal tangles. There will be no choice for selling the same property to many people by the same person and land grabbing will come to an end.

Empowering farmers with solar energy
5 year medium term planning

Farmers should be empowered with additional incomes other than agriculture income so that they do not depend upon government for subsidies.
According to latest reports the number total farmers is 14 crores approximate. There are 14 crore farm workers. If farm incomes are doubled nearly 30 crore people depending upon agriculture sector will be benefitted directly and another 20 crore people, who depend indirectly on agriculture sector, will get benefitted.

New solar energy policy

The central government should declare new solar energy policy, making farmers involved in the solar power generation. As solar power plants require lands as primary investment the formers need to become equal partners in this new solar power policy with an aim to generate 10,00,000 MW of power in the next 5 years to meet total energy demands of entire road transport and railway network. 10,00,000 MWs or 1000 gigawatts capacity of solar power plants require 40,00,000 acres of land. The central government should encourage and help roughly 15 crore farming community in establishing solar power plants across the country with total installed capacity of 1000 gigawatts [GW]. 1000 gigawatts of solar power plants' capacity is equal to 333 gigawatts of thermal power plants or equal to 3,33,333 MW capacity of thermal power plant. 1000 gigawatts installed capacity of solar power plants

produce 10,00,000 x 1000 x 8 x 300 =2,40,000,00,00,000 KWs [units] of power per 300 days of sunshine year. This is worth Rs 7,20,000,00,000,00 at the cost of 3 rupees per unit of power. This power is enough to run 3 crore transport vehicles, buses, cars, motorcycles, auto rickshaws and all electric locomotives.

The government should give free licenses to set up solar power plants on their lands with freedom to sell the produced power at the maximum rate of Rupees 3 per unit to recharge motor cycles, cars, vans, buses, autorikshaws and other transport vehicles

The government should give free and instant licenses to farmers to set up E-vehicle recharge stations on their lands, abutting all national highways, state ways and all roads or on any location, wherever they own lands.

The farmer should be given free hand to sell power from solar power units, either on grid or off grid.

Farmers should have unbridled freedom to use the solar power for their electric motors, poultry, dairy, flour mills, oil mills, rice mills, farm equipment, implements, recharge stations and small-scale agro industries near their solar plants. Henceforth, farmers will produce not only agriculture crops on their lands to feed the nation but also produce solar power to move the nation in the path of double-digit growth rate.

Farmers should be given freedom to choose the investing partners to set up solar power plants and recharge stations.

GST should be totally exempted on sale of solar power if the farmers are partners in the setting up of solar power plants. GST should also be exempted on all solar power plant components like solar panel arrays, solar power condition units, AC and DC cables, battery banks, etc. if farmers are partners in the solar power plant projects.

Bank loans at the rate of 4% per annum should be provided to farmers if they set up solar power plants on their lands.

The government should encourage farmers to form groups or societies to set up power plants and agro based industries. Agricultural produces and power are produced at the same location to make value-added food products in order to get higher incomes in the market. Oil mills, rice mills, flour mills, dal mills, sugarcane crushing mills, etc. can be run on solar power. Rural employment is guaranteed with solar power generation along with agro based small scale industries in every village.

Individuals should be exempted from Income tax if they invest their taxable personal incomes on solar power plants and complete them within one year.

Corporate sector should also be exempted from **corporate tax** if they invest their profits on solar power plants and complete them within one year. One-year period should be made mandatory to get exemption from **corporate tax** so that they complete projects in quick time. But they should sell the power at the rate of 2 rupees per unit [1KW] or use the produced solar power for their own industries. This concession shall be applicable until the target of 1000 gigawatts solar power generation is reached. This prompts the corporate sector to rush into the solar

energy sector. Strict guidelines should be framed for sanctioning loans to solar power units, with main condition that ensures the completion of projects within one year of loan sanctions. Heavy penalties should be imposed on those who have taken loans for solar power units and do not complete within one year.

Allow and give free licenses to farmers who own lands abutting both sides of 67,000 km route lengths of railway tracks. The produced power can be used by Railways at the rate of 2 Rupees per unit [1000 watts] for electric locomotives. The entire fleet of locomotives hauling both passenger and goods trains need 60,000 MWs per hour of power that is equalling the installed capacity of 1,80,000 MWs power of solar plants.

Give 50% subsidy to farmers to setup solar power units with capacity from 10Kw to maximum 1Mw.

The government should consider the possibility of growing shade loving vegetable and fruit crops, creepers, tuber crops and ground-loving crops under PV solar panels. These vast array of PV solar panels can create perfect microclimate conditions with a cooling effect, and better moisture retention for many crops which require low temperatures and low heat radiation. The stands for these PV solar panels can be used by creeper vegetable plants. These solar panels will also shield shade loving crops from heavy damage caused by hailstones during heavy rains.

India at present level needs 10,000,00 MW of solar power to meet the energy needs of road and railway transport, industries, irrigation projects, water supply schemes, commercial establishments, mining sector, street lighting apart from 30 crore households. 10,00,000 Mwh capacity of solar power plants need 40 lakh acres of land. That is equalling just 1.5% of present 35 crore acres of agriculture land under cultivation. With installation of 10,00,000 MW of solar power panels, 40 lakh acres of land under the solar panels can be used for nurturing crops which love cool climate and shade. The value of power produced annually from 10 000 00 MW solar power plants at the rate of Rupees 3 per unit is equal to 10,00,000 x 1000 x 8 x 300 x 3 = rupees 7,20,000,0000000 = Rs 7,20,000 crores.

Rupees 7,20,000 crores = 6% of country's GDP= 30% of agriculture GDP. Farmers' incomes will be doubled, with reduced input costs and guaranteed incomes through power sale. The power of the farmer and the nation will be enhanced.

I suggest the Central government to offer amnesty to tax offenders with 100% tax exemption if they bring back black money stashed abroad and invest in solar power projects and sell the solar power at 2 rupees per unit. This amnesty scheme shall be available with a condition that the solar power projects should be completed within 18 months by spending the black money brought from abroad.

Solar power generation should be included in the agriculture sector. Free and instant licensing policy for solar power plants will boost up solar power generation at the cheap rate and meet all energy needs of the country in next 5 years. Cheap power will cut transport cost, mining cost, material cost and manufacturing cost of all goods. Every product will become cheaper and more

competitive in the international market. India spent 112 billion USD on oil imports in 2018-19 on 212 million tonnes of petroleum. Our import bill in the 2018-19 is approximately 7,84,000 crore rupees. By switching over to e-vehicles using solar power, India can save 7,84,000 crore rupees per annum to decrease negative balance of payments. This saved Rupees 7,84,000 crore will go into the hands of 30 crore farmers. The revenues lost by Centre and States through GST on Petroleum products can be compensated from the savings of 7,84,000 crore rupees on import bill. Half a rupee of GST on every unit solar energy produced will result in the additional revenue of more than 1,50,000 crores on the installed capacity of 10,00,000 mw capacity of total solar energy power. So 10 lakhs crores of saved money on oil imports will be available annually for Centre and sates to invest on health care and transport sector. With cheap electricity, the transport cost will be reduced to ¼ from present transport cost.

According to RBI press releases, India's trade deficit stood at 180.3 billion USD in 2018-19. It is equal to roughly 12,80,130 crore rupees. Out of this, 61 % of the trade deficit is caused by Oil imports bill. If India invests huge amounts in solar power generation and turns to e-vehicles, then India's current account deficit will come down to under 1% in next five years from present level of 2.1% in 2018-19.

If we persist with petroleum-run vehicles, we will have to spend more than Rs 70,000,00 crores [7000 billion crores] on oil imports in next 10 years to meet the energy needs of ever-growing fleet of vehicles run by fossil fuels. The central government should immediately launch new energy policy to change over from oil-based transport sector to e-vehicle based transport sector.

The shortest route to replace oil run vehicles to E-vehicles in next five years

1 The government should remove road taxes and vehicle registrations for Electric mopeds with less than 50 cc capacity and less than 30 km/hour maximum speed limit. Bring these E-vehicles on par with bicycles

2 Allow people to run E-mopeds without driving license and helmet if e-vehicles are less than 50 cc capacity and less than 20 km/hour maximum speed limit

3. Remove GST on all E-mopeds with less than 50 cc capacity and less than 30 Km per hour speed limit

3. Remove also road taxes, vehicle registrations and driving licenses on E-autorikshaws with less than 25 KM/hour speed limit. Bring E-autorikshaws on par with manually run rickshaws. Remove also GST on E-auto rickshaws.

4. Give bank loans on E-vehicles at the interest rate of 4% annum. Remove interest rates completely on demand deposits [savings accounts]. Allow banks to use this interest money on demand deposits [savings account] to give loans on E-vehicles at the rate of 4% per annum

5. The government should give free and instant licenses to farmers to set up E-vehicle recharge stations on their lands, abutting all national highways, state ways and all roads or on any location wherever they own lands.

6. Encourage people to use public transport like buses, rented car, vans, E-auto rickshaws, etc. instead of personal cars. This can be possible only if government remove road taxes, permit taxes, toll fees on Electric buses and rented cars. With the removal of these taxes, the bus fares will become cheaper.
7. The government should mandate all public sector banks to give bank loans for taxi drivers, who buy **Electric cars** or **electric vans** for public transport at the simple interest rate of 4% per annum for first time. He shall not get concessional interest rate up to 8 years from the date of first concession usage. For petrol or diesel car loans taken by individuals for their personal use, an additional 6% interest rate should be collected to cross subsidise the **electric car** loans taken by self-employed drivers for public transport. That means the self-employed cab drivers will get **electric car** loans at the rate of 4% per annum while the private petrol or diesel car owners, taxi operators and multiple cab owners will get car loans at the annual interest rate of [6% + usual bank interest rate for car loans]. The 6% interest rate can be used by banks to subsidise the self-employed **electric car/electric van** drivers.

The possible results that ensue from above measures to transform transport sector into E vehicle transport sector

1. E-transport sector will solve more than 80% of the country problems. It will reduce pollution and unemployment in rural areas
2. Farmers will get benefitted through additional revenues from Electric recharge stations.
3. Transport costs of all commodities and goods will be reduced drastically
4. Small-scale industry will get cheap power and economic growth rate increases
5. Country's import bill will be reduced by over 60%
6. Precious foreign exchange will be saved.

Water resources management for stabilising, enticing and revitalising agriculture sector.

The main objectives of water resources management:-

1. To supply water for 35 crore acres of agriculture land through canals throughout the year.
2. To minimise floods and consequent crop losses worth thousands of crore rupees annually
3. To ward off famines due to lack of sufficient rains and depleting groundwater level
4. To arrest water pollution both on the ground and underground water.
5. To protect all rivers, ponds, lakes and reservoirs from industrial and urban pollution
6. To provide safe and clean drinking water to 30 crore households in India
7. To protect environment by growing thick forests with high canopy trees
8. To make all seasonal rivers into perennial rivers
9. To make short waterways
10. To make organic farming without chemical fertilizers and pesticides

11. To save 50,000 crores worth of electricity annually that is being used to power agriculture pump sets to draw water from deep bore wells. Every acre of land can be irrigated through canals with **water resources management**. Pump sets on canals and ponds will use only 30% of power with respect to pump sets that draw water from deep bore wells.
12. To arrest soil erosion, forest degradation, forest fires and silt accumulation in reservoirs, lakes and other water bodies.
13 To conserve wildlife, mountains, forests and sanctuaries.
14 To make India ever green and clean
15 To promote tourism near reservoirs, rivers and lakes by making them always full with water.
16. To stop using groundwater reserve.

Water resources management is the main key to check water scarcity and water feuds between states. Water resources management for a vast country with huge population and large agricultural land resembling India, requires heavy investment, proper planning, and timely execution of water management projects without delays. India is naturally blessed with super topographical advantages, convenient for water harvesting during monsoon period, when India receives over 70% of its rainfall. I will tell you why India's geographical characteristics can be used to its full advantage to conserve and store water efficiently, and to provide sufficient water supply throughout the year to the entire agricultural land and industries, and to provide safe drinking water to 30 crore households without depending upon groundwater by digging bore wells.
The average rainfall in India is 120 centimetres and India's long-term average precipitation in volume is roughly 3,237 billion cubic metres. I will explain how this water volume is arrived at.
The land area of India is 32, 87,263 square kilometres. One square kilometre constitutes 250 acres of land area and one acre is equal to 4046.86 square metres.
That means 32, 00,000 x 250 x 4046.86 = 3,23,748,80,000,00 cubic metres of water = 3,237 billion cubic metres of water in volume
3,23,748,80,00,000 cubic metres of water = 1, 14,331 Tmc ft of water in volume.
One Tmc ft means one thousand million cubic feet that is equal to 2, 83,16,800 cubic metres.
Water requirement for 30 crore households per annum is 4,000 Tmc, for industries it is 6,000 Tmc and for agriculture sector the requirement is 35,000 Tmc. According to some surveys, 50 % of total precipitation flows to the rivers, and it is estimated to be 1600 billion cubic metres that is equal to 57,165 Tmc. If we harvest and conserve this available surface water through proper water controlling projects, the water will be sufficient to meet the entire demands of irrigation sector, industry sector, forestry sector, domestic and other sectors by 2050. If domestic water demand would increase to 200 litres per capita per day by 2050, then the domestic sector requires 150,00,00,000 x 200 x 365 = 1,09,50,000,00,00,000 litres per annum. That equals to 3,910 Tmc of water.

According to some agriculture experts, the rough estimation is that one Tmc is required each year to irrigate 10000 acres.
That means for irrigation sector the water requirement at the maximum level for 35 crores of land is 35, 00, 000, 00/10000 = 35,000 Tmc.
Water requirement for other uses is estimated to be around 2,000 Tmc.
India's 12 major rivers, 46 medium rivers and countless number of minor rivers flow eastward, [except Narmada, Tapti, and some Himalayan rivers] draining into Bay of Bengal. Rainfall is not uniform throughout India. That is why we need a national water grid system that preserves and stores water at heavy rain fall regions and distribute it to water starved regions through canals and pipelines.
Total provisional cost to execute nationwide water grid system with a series of barrages on all major, medium and minor rivers and link canals to connect with lakes, tanks, ponds and reservoirs, is estimated to be 30 lakh crores to be spent over 10 years of implementation stage. Once completed, this project will make agriculture sector strong enough to produce nearly 100 crore tonnes of food grains that is three times of present production. The target of 100 crore tonnes of food grains can be achieved easily with the ensured water supply through canal network system without depending on ground reserve water. After completion of this project, groundwater usage is completely avoided. Subsequently, saturation of groundwater level is achieved, additional precipitation water to the tune of 400 billion cubic metres will be available to surface water. Currently, groundwater reserve is being used for 40% of irrigation needs and 60% of domestic consumption. This comprehensive irrigation system will save 50,000 mw of power that is being used to draw water from bore wells and also produce 10, 00,000 mw of hydroelectric power by harnessing the potential energy of water stored at higher altitudes.

Three steps to make perfect water resources management

1. One year short term plan
2. five year mid-term plan
3. Ten year long term plan

1. One-year short-term plan - Water conservation at village level and by the farmer participation to conserver rain water and increase ground water. I suggest the Central and all state governments the following steps to conserve water on war footing.

A] All existing ponds, lakes and other water bodies should be desilted. They have lost water storage capacity over the years with sediment. They need to be desilted and deepened to 4 meters depth.

B] Bring all these ponds, lakes and reservoirs out of mining act and allow people and contractors to dredge the clay and gravel freely to fill house sites, land up gradation, for brick manufacturing, for laying roads and railway tracks etc.

D] Give rights to those individuals or societies to catch fish for 10 years if they come forward to deepen these ponds and lakes to 4 metres depth

F] Give 50% subsidy to farmers who want to convert 10% of their land into water pond with 4 meters deep.

G] Involve non-government organisations, NRIs and individuals in desilting and deepening process. Allow the individuals who want to involve in this process, to name these ponds and lakes according to their choosing

2. Five year mid-term plan for constructing barrages coupled with hydro turbines and road bridges across the rivers

1. Interlinking of 12 major rivers, 46 Major rivers and hundreds of minor rivers
2. Connecting all water bodies, ponds, lakes, tanks, reservoirs with gravitation canals, water pumped canals and pipelines.
3. To make rivers into reservoirs, by strengthening river banks and dredging river beds.

Building barrages is a better option than constructing huge dams that consume huge resources in the form of money and lands, displace thousands of families from their habitats, and destroy natural forests. The purpose of constructing barrages is to store water at minimal level without submerging large tracts of land, to divert water through gravitational canals, and to pump water to high lands through canals and pipelines to fill all water bodies. The main aim is to store water at different places instead of storing it at one place. To buttress my point, I will give you one example: the ongoing Polavaram project construction as a case study.

The ongoing Polavaram project on the river Godavari at a huge cost of over 55 thousand crores is a classic example of how the government indulges in bad water resources management.

1. Polavaram project submerges 625 square KMs of land that is equal to 1, 50,000 acres, including precious forest area that is worth thirty thousand crores at present market value.
2. This dam displaces over one lakh people and requires Rs 35,000 crores for rehabilitation, which is 60% of project cost.
3. If we add the land value to the constructions cost and rehabilitation cost, the net cost of the project goes to whopping 85,000 crore rupees.

Huge benefits of barrage construction over dam construction

Dam The height of present dam is 45 metres that includes 25 metre crest level and 20 meters height gates with spillway length of 1200 meters and 2.5 KM ECRF dam
Result – It submerges 1, 50,000 acres. It requires 35,000 crores for rehabilitation

If a barrage is designed with sluice gates and with a total length of 3.7KMs, it could have cost just Rs 5,000 crores saving 50,000 crore rupees and 1, 50,000 acres of land.

The saved 50,000 crore rupee could have been used to construct 12,000 Mwh capacity of solar power plants. 12,000 Mwh solar power is equal to 3,000 Mwh of thermal plants. The water carrying capacity of the left canal and the right canal is 1 TMC per day. Power required to lift 1 TMC of water each into these canals is 250 Mwh. The remaining power could have been used in lift irrigation schemes that already existed on both left side and right side of downstream and upstream of river Godavari. By using 1500 Mwh of power, 10 TMCs of flood waters can be lifted daily by installing lift pumps at different locations from both upside and downside of this

barrage during 5 months of rainy season to dry lands at high altitudes of entire AP to fill all existing lakes, ponds, tanks and reservoirs. Thus, 1200 TMCs of flood water can be pumped to supply water to all existing water bodies and link Godavari with Krishna, Penna and Cauvery rivers. The remaining 1500 Mwh can be used to meet the demand of 20% of agriculture pumps in AP. During the summer season, the entire 12,000 Mwh solar power can be used for 25 lakh agriculture pump sets from morning 9 PM to evening 5 PM in the entire state of AP saving 4,000 crores per year. This saving of 4000 crores per year can be used for deepening of all ponds, lakes, reservoirs and river beds to store more than the 200 TMCs of water that is equal to the storage capacity of Polavaram project.

Furthermore, 3% of storage capacity of any dam is lost every year due to alluvium brought by flood waters.

Storage of water in deepened tanks, ponds, river beds, and reservoirs located at different places will increase the groundwater level uniformly throughout the state.

All medium and minor rivers between two major rivers shall be linked by a series of link canals supported by barrages. Barrages act like lungs to supply water to every acre of land.

Barrages are better option compared to dams

Dam constructions have long gestation periods. The ongoing Polavaram project has been under construction for the last 20 years, still not yet competed. Barrage can be completed within short period of time.

Under this water resources project, a series of barrages are to be constructed on all major, medium and minor rivers at a distance of 30 km apart on major rivers, 15 km apart on medium rivers and from 5 to 8 kms on minor rivers starting from estuaries towards upstream up to the source of the river. 80 % of India's landscape slopes from west and north towards east abutting Bay of Bengal. India's average rainfall is 120 cms and it receives 3000 billion cubic metres of water annually. It is estimated that 1600 billion cubic metres of rain water flows from high-altitude areas of north, east and central India towards east, draining into the Bay of Bengal. The average height of Indian land altitude is 600 metres. For conservative calculation: If we take the average height of the total volume of rain water that flows in rivers as 300 meters to be on safer side for rough estimation, and the total volume of water that can have potential energy at this height is 800 billion cubic metres.

Now we can estimate the hydropower that can be harnessed by constructing a series of barrages coupled with hydro turbines, from 800 billion cubic metres of water that flows from the heights of average of 300 metres to 10 metres MSL. At two metres of minimum gross head, 2 cubic metres of water per second that flows from the turbine for hour generates 25 KWs of hydroelectricity. That means by losing 2 metres of height 2x60x60 = 7200 cubic metres of water will generate 25 KWs of power = 25 units.

800 billion cubic metres of water at the average gross head of 300 metres can produce approximately 80,000,00,00,000/2=40,000,00,00,000/7,200= 5,55,55,555 x 25 x 300 = 41,666,66,66,666Kw/1000 = 41,66,66,666 Mw of electricity. So the total potential energy of Indian surface water that can produce hydroelectricity =

41,666,66,66,666 units of electricity per annum. The value of the total units produced annually is equal to Rs 82,000 crores at the cheap rate of Rs 2 per unit.
This has to be converted into installed capacity
41,66,66,666 Mw/24 = 1,73,61,111 Mw /365 = 47,564 Mwh capacity.
At present India's total installed power capacity 4, 00,000 Mwh including thermal (60%), hydro (13%), renewable (25%) and nuclear (2%) as on April 2021.
As I suggested earlier in this paper if solar energy plants are installed with total capacity of 10,00,000 Mw equalling 3,00,000 Mw of thermal power plants, then total power generation of power from hydro, thermal and solar energy will be 8,00,000 Mw. That will be sufficient for all needs of road and railway transport, industries, irrigation projects, water supply schemes, commercial establishments, mining sector, street lighting apart from 30 crore households.
Solar power units of 10, 00,000 Mw and Hydropower units of 47,000 Mw could complement each other to meet the country's energy demands. The hydro turbines could be used from evening 5 P.M, to next morning 8 A.M. to produce power by releasing water downstream. Stopping hydropower generation during day time is better option when there is no rush of flood waters. The day time energy needs can be entirely met through solar energy at the peak generation of 10, 000, 00 Mw of power.

The outcomes of establishing solar power plants, wind power and hydro power units-

1. The excessive generation of electricity through solar, wind and hydro power can be used to lift water through canals and pipelines to the dry lands at the higher altitude.
2. The entire area of India's agricultural land can be brought under ensured water irrigation through gravitational canals and lift irrigation canals.
3. To reduce floods by lifting water through canals and pipes to fill ponds, tanks, reservoirs on dry lands at high altitudes which suffer from acute water shortage due to little rainfall.
4. The farm output can be tripled to record level of 100 crore tonnes from the present level of 35 crore tonnes. The value of additional 70 crore tonnes of food grains is equal to 14, 00,000 crores. This huge production of food grains will be sufficient not only to nourish 140 crore people and 60 crore livestock, but also flood international markets with cheap prices.
5. With ensured water supply, three crops can be raised per year on every acre of land. That increases rural employment. The migration from rural areas to urban areas can be stopped.
6. Having met India's energy needs through solar, wind and hydro power, thermal plants can run on half of its capacity. The dependence on coal will be reduced by half. The existing thermal plants could be turned into backup generators that work to full capacity only when monsoon fails. There is no need to construct new thermal plants.
7. All nuclear power plants known for creation of wastes which are radioactive and hazardous to human life, can be phased out one by one, in due course of time.

8. Groundwater usage can be completely stopped.
9. The heights of all existing dams can be reduced by 5 feet per year so that 20 lakh acres of forest land that was submerged due to these dams can be brought back into life. This reclaimed land can be used for raising thick forest with high canopy of fruit bearing and non-fruit bearing trees to support animal life.
10. With cheap electricity available through solar and hydropower plants to industries, commercial establishments and service sector, the goods or services produced would become cheaper and competitive at international markets with decrease in material cost, production cost, transport cost and services cost.
11. The import bill on food grains and crude oil to the tune of Rs 8, 00,000 crores will be saved. The loss of revenue in the form of taxes on petroleum products will be compensated by the savings on imported crude oil, cooking oil, fruits and nuts.

Method of constructing barrages

1. Barrages are to be constructed on all major, medium and minor rivers at a distance of 30 km apart on major rivers, 15 km apart on medium rivers and from 5 to 8 kms on minor rivers starting from estuaries towards upstream up to the source of the river.
2. Barrage height is to be determined so that the stored backwater can reach unto halfway distance to upstream barrage. The remaining half length of the river shall be used to take the rain water from streams, rivulets, and canals so that there will be no submergence of lands due to heavy rains.
3. The height of the river banks at the barrage should be raised by 2 metres and run up to halfway distance to upstream barrage.
4. The entire length of the river bed between two barrages shall be deepened by removing sand deposits. This sand can be supplied at minimal prices for constructions. The sand deposits are to be removed every year and supplied for construction of houses or projects. The river portion between two barrages will become a reservoir. With constructions of barrages, the sand availability increases.
5. Diaphragm wall is to be constructed to stop water seepage under the barrage. It increases the barrage longevity.
6. Piers and pillars are to be constructed for the road bridge above and for installation of crest gates between them to pass the flood waters.
7. A still basin of 200 metres or more width between two banks on the river bed, to be constructed so that 100 meters downside and 100 metres upstream of the barrage. The still basins must be designed to facilitate deepening of the river between barrages. The still basin is also to be designed to dissipate the excess hydraulic energy downstream the barrage.
8. Crest gates shall occupy ¾ of the river width and the remaining 1/4 length of the barrage shall be used for water turbine installations on both sides of the barrage.
9. The still basin/spillway height can be determined so that stored back water cannot reach more than 1/3 of the distance towards upstream barrage.
10. Head regulators or to be installed for two canals, one on each side of the river bank, for water diversion either through gravitation or by lifting water through pump sets.

11. The power generated by the water turbines shall be used to pump water into canals that carry it to dry lands at higher altitude above the river water level.
12. The height of the spillway/still basin should be fixed for discharge of maximum flood waters recorded during the last 100 years without overflowing river banks and the road bridge on pillars.
13. The river banks towards upstream should be strengthened with riprap up to the distance where back waters reach.
14. Barrages act as an impediment to the natural flow of sediment transported by the river flow. This sediment gets deposited upstream of the barrage. At every barrage there should be a water injection dredger permanently placed for the regular flushing of sediment. This highly fertile sediment can be supplied free to farmers to enrich the agricultural lands adjacent to the river. This sediment increases the vitality of the soil and decreases the usage of chemical fertilizers.
15. There must be provision separately on the bridge for electrically operated crane to move on the rails apart from regular movement of traffic. This crane can be used to remove trees, branches, agriculture waste, etc., that comes with flash floods. The floating garbage may choke the intakes of turbines and hamper power generation.

Water resource management: 10-year long term plan

This 10 –year long term plan includes three steps
This is the most important phase of water resources management. This
Conservation of water at mountains, on mountains and between mountains makes all major, medium and minor rivers perennial. Water conservation at mountains is easy, time saving and cost-effective when compared to dam constructions. The main objective of water conservation plans at mountains is to protect natural forests, animal life, increase soil absorption and land fertility, decrease flash floods and soil erosion. The benefits of water conservation at mountains are enormous in the long run. Thick forests with high canopy trees can be grown on mountain tops and its slopes. Thick forests on mountain tops and its lopes absorb the intensity of heavy rainfalls to check soil erosion and decrease the sediment deposits on river beds and dam beds. The longevity of dam storage capacities increases.
Mountains occupy 9, 60,000 square kms of Indian land. Out of which, the Himalayas occupy 5, 00,000 square kms of land area. Vindhya ranges, Satpura ranges, Aravali ranges, Western Ghats and Eastern Ghats, in India's peninsular region, occupy nearly 4,00,000 square KMs of land. That is equal to 10 crore acres and 12% of Indian land area. Vindhya ranges, Satpura ranges, Aravali ranges, and Western Ghats and Easter Ghats are ideally suited for rain water conservation, as they receive 15% of India's total rainfall that is equal to 35,000 cubic KMs of water. 35,000 cubic KMs of water is equal to 12,360 TMC of water. The average height of these mountain ranges and Ghats is 600 metres. Conservation of rain water at these altitudes gives more potential energy to water by virtue of its position.
Water conservation method on mountain range includes three steps
1. Digging deep trenches at the Foot of the Mountains.

2. Construction of check dams between mountain valleys
3. Construction of ponds on flat mountains.

Digging deep trenches at the Foot of the Mountains.

1, The total length of deep trenches that are to be dug around the mountains of Vindhya ranges, Satpura ranges, Aravali ranges, and Western Ghats and Easter Ghats in peninsular India is approximately 5,00,000 KMs.

2 The trenches should be 8 metres deep and 12 metres wide to store rain water from the summit and slopes of the mountains. The dug material should be used as a rock and earth wall with a height of 8 metres on the downside of this trench around the mountains. The rainwater running down from mountains first fills these trenches before overflow into streams and rivers. This rampart, formed by the mound of earth dug by excavators, will act as a fortification around mountains for protection of animal habitat. There must be a provision for a ramp at every 3KMs with a small undug portion. The animals that fell accidently into these trenches would easily walk to the ground by the ramps. In 10 to 20 years these trenches will be filled with vegetation, dead leaves, pebbles, top soil, etc. There shall be no problem with accumulation of sediments in the trenches. The mixture of these sediments will act as a super sponge to absorb water into the ground. The accumulated mass over the years in the trenches can be supplied to farmers free for enrichment of agricultural lands.

3. **Cost of digging trenches**. Heavy excavators with a capacity of digging 8 metres deep and 12 wide trenches shall be used. The estimated cost of digging 8 metres deep and 12 metres wide trench may be nearly 80 lakhs per one km of length. The total cost of digging 5 lakh KMs length of trenches at the foot of the hills and mountains cost nearly 4 lakh crores. The digging of trenches is necessary to preserve rain water in mountain ranges and Ghats in peninsular India. The embankments adjoining the trenches are useful in safeguarding forest trees from being illegally cut by smugglers and preventing animal poaching and protection of wildlife.

4. **Formation of ponds on flat mountains**. Approximately 40% of peninsular mountains are nearly flat topped up to 20% corresponding to their base areas. If the top area of the mountains, which constitutes 10% of the total occupied land area of the peninsular mountains for water conservation, 1000 TMC of water can be stored on mountain tops.

5. The available top area of the mountains shall be divided into one-hectare portions. A 5 metre width and 3 metre depth around each hectare should be dug and this dug material should be used for pond embankments of the height of 3 metres. The centre of the tank shall be left untouched for raising high canopy trees. Trees are also raised on the embankments of all ponds. The purpose of these tanks on mountain tops is to preserve every drop of rain water that falls on the mountains and stop running down the mountains. So the entire mountain tops will be covered with high canopy trees surviving on the water stored in the ponds. This stored water in the

rainy season on mountain tops slowly percolates through all its sloping sides to its feet, where deep trenches are dug to catch the running waters from mountain slopes. Heavy forests can survive on mountain slopes in the hot summer season, also by absorbing water that slowly oozes from multiple ponds on mountain tops.

5. The most important step in water conservation is construction of check dams across streams in mountain valleys. These 3 metre height check dams, at regular distances in valleys, will inhibit the flow of running water streams between mountains and help forming of small brooks and lakes. The countless number of check dams on all peninsular mountain ranges help water conservation in huge level at low cost, without damaging flora and fauna. These check dams between mountains and ponds on mountain tops keep forests evergreen and will become highly productive in terms of fruits, honey, lac, herbs, fodder for animals and other forest products. These evergreen, high productive forests enabled by the water conservation projects hugely benefit tribals who primarily depend on forest products for their livelihood. The increased forest cover with availability of water throughout the year will keep forest herbivores thriving in large numbers, leading to plentiful availability of non-vegetarian food for tribal population.

Thus, the basic thrust of water resources management is to store water everywhere and widespread, from high altitudes to low altitudes: on mountain tops; at the feet of the mountains; in rivers, in lakes and in village ponds, to quench the thirst of every acre of land every day during the entire year. The focus of water storage should be shifted from the concentrated storage in large dams that submerge huge lands and displace lakhs of people to decentralised storage of water with minimum environmental damage.

Total investment for revitalising agriculture sector

Cost of solar power plants with 10 lakh MW capacity = 40 lakh crores [Without land cost]
Cost of digging 5 lakh KMs of trenches around mountains = 4 lakh crores
Cost of formation of ponds on mountain tops = 2 lakh crores
Cost of constructing check dams = 3 lakh crores
Cost of barrages, turbines, canals, pipelines =20 lakh crores

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Total cost = 69 lakh crores

Benefits

Value of the solar power generation at 2 Rs per unit = 5 lakh crores
Value of hydro power generation = 1 lakh crore
Value of increased food grains production = 14 lakh crores
Value of savings on imported vegetable oils, fruits, nuts, petroleum products, etc. = 4 lakh crores
Total visible benefits = 20 lakh crores

Invisible benefits

Rural employment is guaranteed with the availability of plentiful water to agriculture throughout the year. The migration from rural areas to urban areas In search of employment will be stopped. With the arrest of water shortages, self-sufficiency in food grains could be achieved. There will be sufficient production of fodder for cattle, thereby increasing milk and dairy products. By switching over to fossil fuel vehicles to e-vehicles, the transport cost will be halved. According to government reports [subject to correction], there are about 22 crore motor cycles, scooters and mopeds, 3 crore cars, taxis and jeeps, and 60 lakh auto rickshaws. If 90% of motor cycles, scooters, mopeds and auto rickshaws, and 50% of cars are transformed into e-vehicles with cheap supply of solar power for recharging, then carbon emissions could be reduced by 100 crore tons from 300 crore tons annually. India's percentage of global emissions will be reduced from 7% to 4%. The cumulative effects of reduced carbon emissions, the evergreen forests with high canopy trees and complete greenery encompassing entire land area will reduce the average temperatures in India by at least 2 degree centigrade.

If agriculture reforms and water resources management packed with solar power and wind power generations are not initiated immediately, then the severe water shortages could cause India's food grains production to decline by 30%. Without proper water utilisation projects the water wars between states could aggravate further.

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Disclaimer – The figures stated in this paper are subject to correction. All suggestions expressed in this document are borne out of my pure imagination and may not be true or practicable.

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