

**THE GARLAND CANAL PROJECT**  
**— ANSWER TO INDIA'S FLOOD, FOOD AND**  
**UNEMPLOYMENT PROBLEMS**

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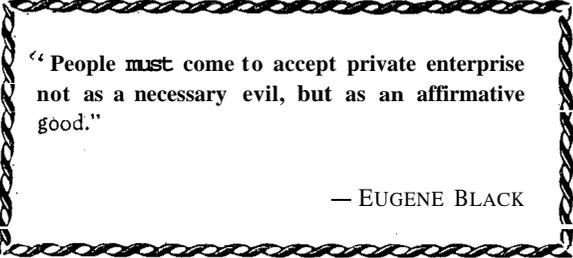
# THE GARLAND CANAL PROJECT

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Floods and droughts, food, energy, transport and remunerative occupation for our millions in their own surroundings are major problems facing India today. On their solution depends the future progress and prosperity of India. Development of a certain state of mind is essential for the progress and prosperity of the nation which can only be achieved by giving remunerative occupation to our millions in their own surroundings.

Let me differentiate between occupation and employment. Occupation is work of one's own liking in one's own surrounding. It may be remunerative or may not be. This is not the case with employment. The major factor with employment is remuneration. For employment people have to leave hearth and home and may have to go away miles in search of



“People ~~must~~ come to accept private enterprise not as a necessary evil, but as an affirmative good.”

— EUGENE BLACK

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\*This is the text of the 13th A. D. Shroff Memorial Lecture delivered in Bombay on 27th October, 1978. The author is a well-known technocrat. and this imaginative project has attracted world-wide attention.

it. That is why we have this exodus from rural areas into towns and cities. People searching for employment, to earn their livelihood are overcrowding the cities, creating slums and the lowest form of human life style. It is a disgrace for our nation, to let this state of affairs continue like this. So it is the bounden duty of our Government to see that our 600 millions get remunerative occupation in their own surroundings.

For some years now, the necessity of total commitment of the people of India to economic growth and progress has been stressed continuously. No such commitment has so far manifested itself in practical terms because arousing popular commitment to such abstractions as progress and prosperity is practically an impossible task without giving them remunerative occupation in their own surroundings. They need something great, something awe-inspiring, something useful to visualise and see growing out of their own efforts. Then only progress and prosperity are possible.

Space, atomic energy, development of our industrial and mineral resources, even discovery and recovery of oil have their limitations. Millions are being spent daily on all these items but that is not going to solve the major problems of floods and drought, or give food, energy, transport or remunerative occupation to 600 millions in their own surroundings. These are the essentials for progress and prosperity of our country.

India is basically an agricultural country but we chased the wrong shadow of industrialisation for 30 years after Independence, putting industry before agriculture and find ourselves in economic trouble today.

Development of industry for a nation like India should be such that it should help develop agriculture first and should help only to manufacture the basic necessities of life for masses. The emphasis

should be on health, housing, communication, textiles, and other essentials of life.

It is only conservation of our 900 million acres of land and 3,000 million acre feet of monsoon water every year in conjunction with our under-ground water resources flowing under controlled conditions with the aid of our people which can help us to tide over economic difficulties, putting us on the path of eternal progress and prosperity. The answer to this is to build a trans-basin continental canal under the "Garland Canal Project".

The Garland Canal Project also, known as the Dastur Plan is a long-range defence against floods and drought, hunger and malnutrition. If brought to fruition, it will jack up not only the entire Indian Nation but also the whole of South-East Asia and that too the weakest section of humanity by a few points in human lifestyle and social security. This single item will solve almost all problems for India — of floods and drought, food, energy, transport and remunerative occupation for our 600 millions in their own surroundings.

### **A DESCRIPTION OF THE GARLAND CANAL PROJECT**

India has 800 million acres of flat land and 900 million acres of geographical area. It is showered by 3,000 million acre feet of monsoon water, brought in by North-East and South-West Monsoon. If all this water is collected and spread over these 800 million acres of flat area, it will raise the level of the water from the ground by about 4 feet.

Now this is not the only water to contend with. There is more water flowing from the Northern slopes of Himalayas into the plains of India, brought in by the Brahmaputra, Ganga, Indus and their North Side tributaries. Every year with sickening regularity we get floods and deluge bringing in its wake destruction of life and property and causing

vicious displacement of people from their hearths and home.

In order to arrest all these waters before the rivers leave the mountain gorges, then to conserve and distribute the same to the plains of India wherever and whenever required during the year, we have to build these two mammoth canals with integrated lakes — the Himalayan Canal which will conserve and control the glacial flow and the glacial rivers and the Central and Southern Garland Canal which will control and conserve the flow of the monsoon fed rivers.

The Himalayan Canal starts from River Ravi, skirts the periphery of the Himalayan Range at an even height of 1,200 ft. above MSL and joins Brahmaputra river, then it descends further south skirting the eastern range of the Himalayas at the same height, passes through Chirapunji and joins a river which flows into the Chittagong harbour. Thus we will succeed in bringing the sea to all the landlocked countries of the Himalayas.

The Himalayan Canal will be 2,600 miles long. It will conserve about 250 million acres feet of water out of the total Himalayan flow of 500 million acre feet and will distribute the rest. It will have nearly 30 integrated lakes sandwiched between the periphery of the Himalayan Range and a 100 feet rear bund of the canal. Each lake is on an average 120 feet deep, about 1.25 miles broad and each is segregated at  $33\frac{1}{3}$  miles distance by a bund with gates. The canal is in front of the continuous integrated lakes and is 1,000 feet broad and 50 feet deep which is formed by the front bund of the canal. The canal has got flood gates which opens up to the subsidiary canals which are positioned at every two miles distance on the main canal and forms part of the herringbone system of drainage and irrigation. The permanent level of water in the canal which is filled by the lakes behind is 30 feet high.

The Central and Southern Garland Canal starts from the centre of the North Part of the Central Plateau skirting both sides of the Central Plateau, the Deccan Plateau and the Southern Plateau, joining at a point somewhere near Cape Comorin forming a complete garland, that is why it is known as the Central and Southern Garland Canal.

It has got 200 integrated lakes similarly built as in the Himalayan Canal and two very big lakes, one in Nagore in Rajasthan and the other one in the Valley of Son. The conserving capacity of this canal with its integrated lake is in the vicinity of about 750 million acre feet of water. It is 5,800 miles long and it is built at an even height of about 1,000 feet above MSL.

The two canals are joined at two points by pipe lines and also by an old course of river which flows into the Rajputana desert which is treated by raising bunds on both the sides, joining the Himalayan Canal to the Central and Southern Garland Canal. In this way we can bring huge quantities of water into the Central and Southern Garland Canal from the Himalayas.

The transfer and distribution of water in the Garland Canal Scheme takes place purely by gravity and no energy is needed whatsoever.

There are three points shown on the map in the Jamuna basin from where the surplus water can be also re-cycled into the Central and Southern Garland Canal if required by means of unlimited hydro-electric power we will be having at our disposal once the garland canal project is constructed thus retarding the progress of the water flowing into the sea and dissipating itself.

In order to supply water to the plains under controlled conditions at every two miles interval on the main canal are positioned subsidiary canals. They form part of the system, known as the herringbone

system of drainage and irrigation. This system helps to keep the plains of India irrigated by supplying them water if needed at the same time draining the water in river basins in case the lands are water-logged. In short, it will help keep the underground water table at a depth say about 6 to 10 ft. from the ground surface which is most suitable for irrigation.

### ALL ABOUT BENEFITS

Once the project is brought to fruition, there will be tremendous benefits. Floods and draught will be a matter of past, India and Bangla Desh will become granaries of the world and a source of life-giving food supplies to humanity. We will be able to retrieve and cultivate 540 million acres of land and settle not 60 crores but 90 crores individuals on land and in agriculture only (we are thinking ahead now). Indian can become tax free and duty free from agricultural income only. We will be able to generate unlimited hydro-electric power which can be utilised for the development of industrial and mineral resources of the country, for transport, for agriculture, for domestic purposes and for all other purposes for which today we are burning our precious oil, coal and bagasse, which can be saved and used for making polymers and by-products. Use of electric power for all purposes will reduce pollution problem considerably. Total transport problem will be solved. Medium size steamers can ply in these mammoth canals. There will be roads and railway lines on embankments of the canals — 8,400 miles. The subterranean reservoirs at plain level and also upto quite a distance on the catchment side of the canal will remain perennially full because of the vast expanse of water held by the canal and the integrated lakes so percolation will take place. This water can be surfaced by unlimited hydro-electric power which we will be having at our disposal and this water can be utilised for all purposes.

Once lands of India are irrigated and made lush with vegetation, the Indian subcontinent will have a very temperate climate and the present existing water imbalance will be considerably reduced, i.e., rainfall will be more evenly distributed over the subcontinent.

Also there are chances that the permanent Himalayan snowline will slowly recede back to take its original position, on construction of these canals. There are several other advantages like development of fisheries, animal husbandry and generating several types of new industries.

Let us not close our eyes and refuse the promise of vast material wealth, national discipline and a total transformation in our national character which is of great importance.

Before I go to explain how to Build the "Garland Canal Project" and the economics of the same, I would like to say a few words on floods which is the immediate problem facing us at present, their causes and their increasing frequency and intensity. Also to appreciate the situation it is necessary to discuss the actual needs of water and land for the present and projected for the future.

### ALL ABOUT FLOODS

Himalayas on top hold a veritable lake of ice in sub-zero temperature. Nearly 3,000 million acre feet of water that is equivalent to our one year's rainfall with water trickling down from this lake of ice forming huge rivers flowing North, South, East and West, sustains half the humanity of the world and that too the weakest section of humanity, 25% of world humanity occupying the lands in the immediate vicinities of the Himalayas and other 25% living on life giving supplies generated by the Himalayan water and the lands surrounding it and transported all over the world.

Now the permanent Himalayan snowline is receding fairly fast, from the Southern slopes, in its wake creating a broad barren belt of land (starting from about 2,000' M.S.L., the original position of the Himalayan snowline which has receded to about 16,000' M.S.L.. the present position, in about 1,500 years) from E to W on the Himalayan range, which formerly used to be covered with ice as snow used to fall on it (which means that it used to be a veritable lake of ice conserving water for use all round the year) and the water used to trickle down slowly which gave time for water to flow down into the sea. Now heavy precipitation in the form of rain on these barren areas fill up the river gorges and water rushes down in the plains unchecked, bringing with it grit and stones, covering the Northern Plains of India and their river courses, causing deluge.

The above cycle is repeated again and again during the Monsoon season causing increase in frequency and intensity of these flash floods, because of the evaporation taking place from the vast inundated areas by the sudden descent of the Himalayan water flow into the plain. These flooded lands offer large surface area for evaporation and about 60% of the flow in the plain evaporates again into the atmosphere, very little going underground as the lands are already saturated, creating a cycle of precipitation in form of torrential rains in the catchment areas as well as in the plains; then evaporation again, and rain again and so on. This cycle retards the surface flow towards the sea more or less and holding huge quantities of water in the flooded and water logged plains and in the river basins which are being constantly replenished by the help of catchment areas formulated by the Himalayan Range, M.P. Plateau and even the Northern parts of the Deccan Plateau aided by the recycling process resulting in severe flash floods in the basins of the rivers and their tributaries fed by these catchment areas.

Studies clearly show that these' conditions will increase year by year in intensity and frequency till it becomes unbearable, and our villages, towns and cities positioned on river basins and our alluvial lands will be destroyed and lost to us for ever — reaching a point of no return in a few years' time if allowed to go unchecked.

To appreciate the situation, it is also necessary to discuss the actual utilisation of water and land at present, as well as projections for the future. The present utilisation of water for a population of 600 million is 360 million acre feet which is inadequate. The anticipated need by A.D. 2,000 for a population of 900 million will be 680 million acre feet and ultimate potential development of all water resources at post precipitation phase will be 1,620 million acre feet.

As the demand for water will rise in proportion to the increase in population, this increase will make a frightening demand of 42% of the total potential resources, as against 22% today. Considering the severe conditions existing today with a reserve margin of 78%, the emerging situation, when this gradually decreases to a mere 58% by A.D. 2000, should cause great anxiety.

The present methodology of building big and small dams in the river basins to conserve water has become an obsession with us. It is impossible to conserve 1,356 million acre feet of surface flow of India in this way, neither can it stop the floods. On the contrary, experience tells us that the floods are aggravated by this methodology.

Statistics tells us that even if we dam all the big and small sites available for reservoirs in India to conserve water, it will hardly reach the mark of 120 million acre feet of water, more, whilst by 2,000 A.D. our water requirements will be 680 million acre feet. So we definitely need to build up a long range defence by a Master Plan like the "Garland Canal

Project" against hunger and malnutrition. Further more by building these dams, we are leaving an untractable problem behind for our future generation. These reservoirs have a life span of 60 to 70 years because of siltation. The silt fills up the reservoir after a time and reduces it conserving efficiency. A time comes when the water starts overflowing into the command area causing waterlogging of our alluvial lands. This means that our next generation will neither have land nor sites to conserve water when they will be needing them most with the population increase, to about 900 million by 2000 A.D. Surely, our generation has a great responsibility to develop our water resources.

At present, a total of about 370 million acres of land are cultivated and a major part of this acreage depends on seasonal rainfall; only about 70 million acres are irrigated. Cultivation of all that land, which does not make 600 million human beings self-sufficient in food and necessities of life today, because of vagaries of monsoon, is a must.

According to Indian ecologists, out of 900 million acres of Indian lands, about 450 million acres are total waste. 335 million acres are lost on account of water and wind erosions, 15 million acres due to water-logging and salinity, 50 million acres are subject to floods, another 50 million acres go waste on account of haphazard canal irrigation and arrangements for prevention of floods. About 27% of the subcontinent is exposed to water erosion and about 15.7% to wind erosion.

The process of erosion is a continuous one, daily devouring our most fertile lands more and more. This should be checked by some means or the other and our lost lands retrieved, as by 2000 A.D. to make 900 million self-sufficient in food and necessities of life, we will need to irrigate 540 million acres of land. The position is frightening. The problem is not so much of how to develop our water and land re-

sources, but how to prepare for the prevention of a disaster.

The present world irrigated area is 500 million acres. Due to bad drainage system already 20% of it is lost to us due to water logging and salination. Even with the irrigation of this area half the population of the world is under-fed.

Most experts agree that the growth of the world irrigated area cannot be more than one per cent per gear of 500 million acres for the rest of the century whilst the population increase will be 2/3 of the present population. Mankind faces the bleak prospect of unmitigated hunger by 2,000 A.D. It need not be so. 540 million acres of the only ideal alluvial lands are the plains of India which have the water and manpower for irrigation.

With construction of trans-basin continental canals on the style of the "Garland Canal Project", we will be able to irrigate 420 million acres more in 15 to 20 years bringing the total irrigated area of India to 540 million acres and the world irrigated area to 960 million acres by 2,000 A.D.

India, indeed, can be a granary of the world and a source of life-sustaining supplies to mankind.

The next question will be how can we build this mammoth canal in the shortest possible time and in the cheapest possible way.

In order to do that we have to bring the army into the picture. The army will take the total control of the project. Each and every recruit and each and every individual working on the project will become an army man and will stay that way all his life. Even after he reverts back to land and agriculture, he will be at the beck and call of the army all the time whenever required. Army will be responsible for his welfare and army will be responsible for his work output. This kind of voluntary recruitment by the

army will not only instil tremendous discipline in the nation, but also India will be a force to contend with during times of national emergencies. Every man is potentially an army man. This type of voluntarily recruited labour, i.e., work-oriented labour motivated by incentives on completion of the project, will give tremendous impetus to efficiency and production,

The whole project is divided into three phases. In the first phase, the army engineers, engineers from State P.W.D. the Central P.W.D. various other Government Departments, engineers from Municipalities and Engineering Students will take part in surveying and marking the course of the Canal and the level of the canal. This will take about a year and a half to two years depending upon the co-operation, co-ordination and organisation of the Departments taking part in it.

In the same phase, the army will recruit two crore (20 million) able bodied individuals from the age group of 18 to 26 with an incentive that on completion of the project they will settle down on land and agriculture with an initial pay of Rs. 350/- and a share in the profits and management. Profit as such will be distributed as dividends equally which will increase every year. Each recruit, on selection, will pay to the army for his up-keep and for his food for the duration of the project till they settle on land and agriculture, and start earning their living on an amount fixed by the army. If a recruit is incapable of paying this amount and if the army wants him then the Bank will advance him this amount to be paid back by the recruit to the Bank, once he settles down on land and agriculture.

In the first phase, army also carries out an experiment by selecting one mile of canal length in each state and digging that canal length with all the amenities attached to it in 300 days and one dry season this will give the army an exact idea of what is

the labour force required and the machinery required to do this work in three hundred days. Also it will give the army experienced recruits to be distributed on 8,400 miles of canal work in the second phase.

In the first phase, the army will also establish camps at each mile of the canal length, that is, it will establish 8,400 such camps for housing 2,000 recruits on each mile during the second phase when the actual work starts on 8,400 miles of canal length.

After all these preparations are made in the first phase, in the second phase the digging of the canal, the building of the embankment of the canals, the building of the railway lines and the highways on the embankments, the bunding of the rivers and the building of the bridges across the canal, the building of subsidiary canals, also constructing power houses and connecting them with grids, joining the two main canals by laying pipe-line at two spots in the project plan and preparing land for agriculture four miles broad and 8,400 miles long on both sides of the canal embankment, for the first batch of recruits to settle down on land and agriculture on completion of the project take place.

In the second phase further two crore (i.e. 20 million) recruits are selected by the army from the same age group of 18-26 on the same terms and conditions and on the same incentives as before to be settled in the third stage on land they will prepare for agriculture.

After all the work is finished in the second phase the third stage consists of preparing four mile broad and 8,400 miles long stops for agriculture on which two crore of individuals will be settled each year. This development will take place step by step every year. More steps can be developed like the above in one year once the Government has more money to do so after a few steps are built. As for

these steps development the sea is the limit on the East, Pakistan Border and Arabian Sea on the West. That means the total deserts of India will be developed and of course the Northern Plains of India will be developed the same way in step cultivation.

Imagine 540 million acres of land under step cultivation which can settle 90 crores or more individuals on land and agriculture only, i.e., 30 crores pioneer workers with a family of two each.

The gross agricultural revenue every year from 540 million acres with perennial water should be in the vicinity of Rs. 2,700/- billion. After deduction of expenses and the wages of the recruits the net revenue should be in the vicinity of Rs. 1,100/- billion. Imagine the tremendous prosperity for the nation. This profit is divided 1/3 going as dividends to the recruits which is equally divided amongst them in addition to their 1/3 of their wages going to the Government as their share of profits out of which in the beginning the Government pays off the Landlords whose lands are acquired to build the project and 1/3 going to the reserve fund to be reinvested the dividends from that again distributed the same way as profit are distributed so there is no looking back, everybody will get more dividends every year and all the three blocks will be getting richer and richer. A time will come when we will have to look for investments outside as there will be lot of surplus monies with everybody and India can go tax free and duty free only on agricultural income.

### **COST OF THE PROJECT**

With free and work oriented labour, motivated by incentives on completion of the project, and also with all materials found free on spot like sand, earth stone etc., and whatever amount of cement and steel required paid for, the project will cost us in the vicinity of Rs. 15,0001- to Rs. 17,0001- crores in about four to five gears.

It cannot be considered a big sum at all as our own five year plan consists of Rs. 1,16,000 crores out of which nearly Rs. 69,000 crores is set aside for public sector, and out of that 45% is meant for agriculture. So even if we spend all the amount set aside for agriculture that alone will solve all problems for India of floods and drought, food, energy, transport and remunerative occupation for our 600 millions in their own surroundings.

*(The views expressed in this booklet are not necessarily the views of the Forum of Free Enterprise.)*

## A. D. SHROFF

(1899-1965)

Founder President

FORUM OF FREE ENTERPRISE



After graduating from Sydenham College in Bombay and the London School of Economics, Mr. Shroff started as an apprentice at the Chase Bank in London. On return to India, he joined a well-known firm of sharebrokers and was also teaching advanced banking at the Sydenham College of Commerce & Economics. For over forty years, he was associated with a number of industrial and commercial enterprises, many of which owe their origin and development to him. He was a Director of leading concerns like Tatas.

A. D. Shroff, eminent economist and industrialist, was associated with promotion of planning in the country even before Independence. When Netaji Subhas Chandra Bose was the President of the Indian National Congress in 1938 he appointed a National Planning Committee with Pandit Jawaharlal Nehru as the Chairman. Mr. Shroff was one of the members of the Committee.

He was one of the eight authors of the well-known Bombay Plan presented to the country by private enterprise in 1944. He was also an unofficial delegate at the Bretton Woods Conference in 1944 which set up the World Bank and the International Monetary Fund.

He served on a number of committees including the well-known Shroff Committee on Finance for the Private Sector set up by the Reserve Bank of India.

"Free Enterprise was born with man and shall survive as long as man survives."

—A. D. SHROFF  
(1899-1965)  
Founder-President,  
Forum of Free Enterprise.

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The Forum of Free Enterprise is a non-political and non-partisan organisation, started in 1956, to educate public opinion in India on free enterprise and its close relationship with the democratic **way** of life. The Forum seeks to stimulate public thinking on vital economic problems of the day through booklets and leaflets, meetings, essay competitions, and other means as befit a democratic society.

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