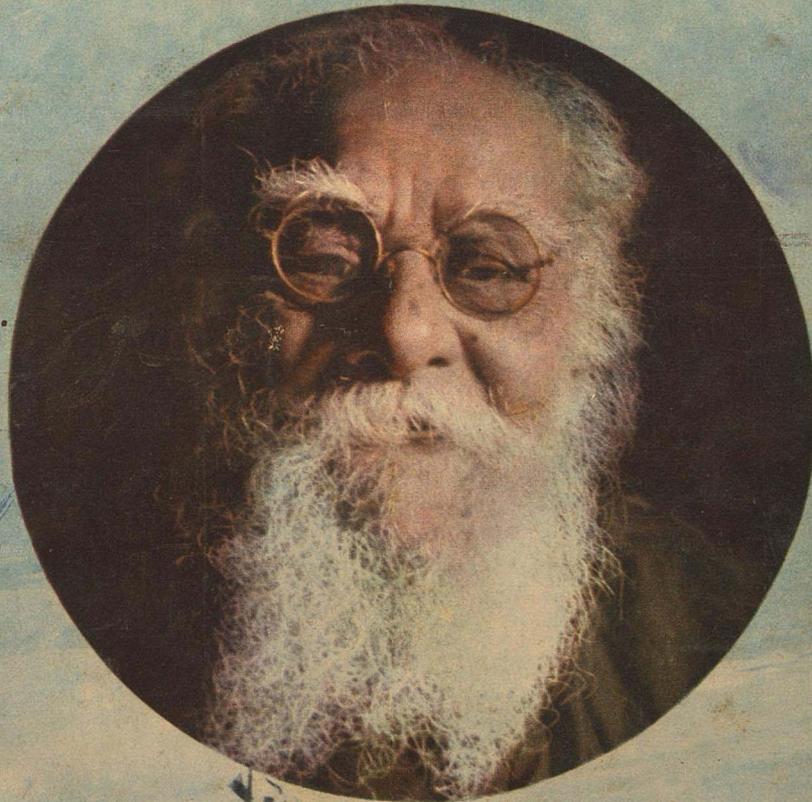


Tamil Arasu

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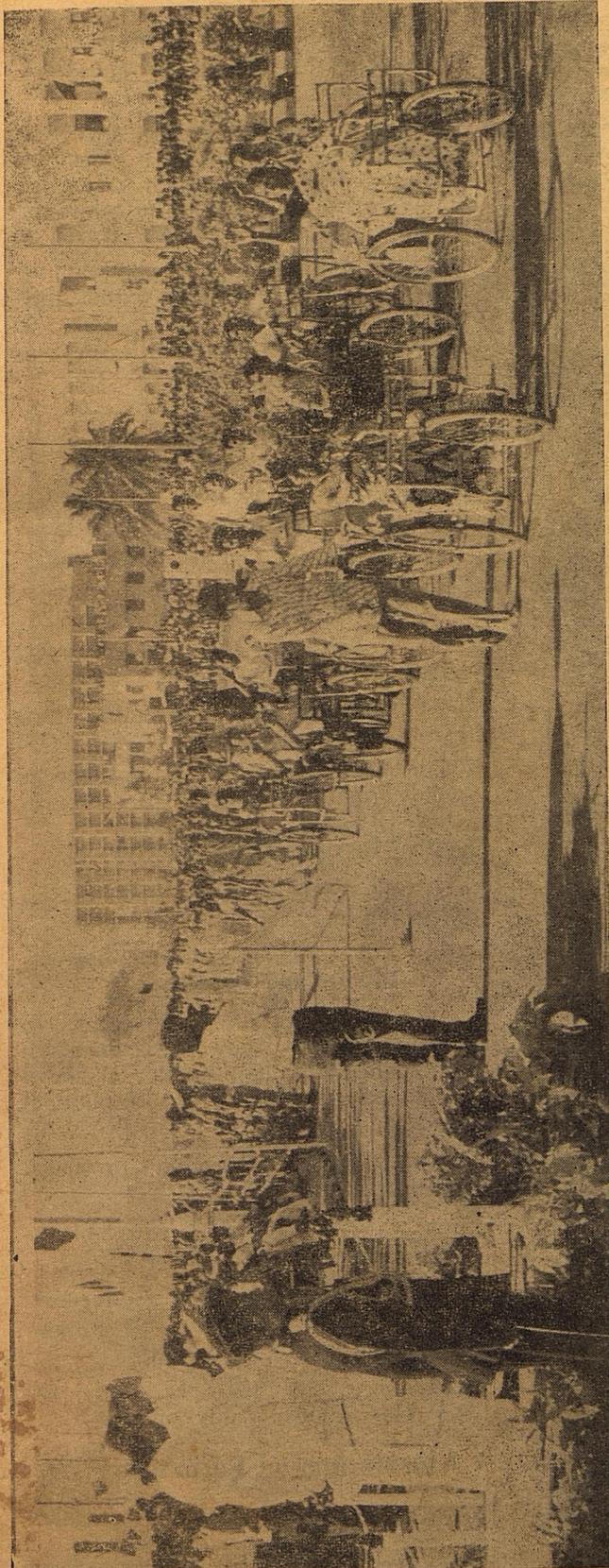
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REPUBLIC DAY AT MADRAS



The rehabilitated members of the Physically Handicapped made an impressive March Past.

Tamil Arasu

Vol. V

February, 1975

Issue 8

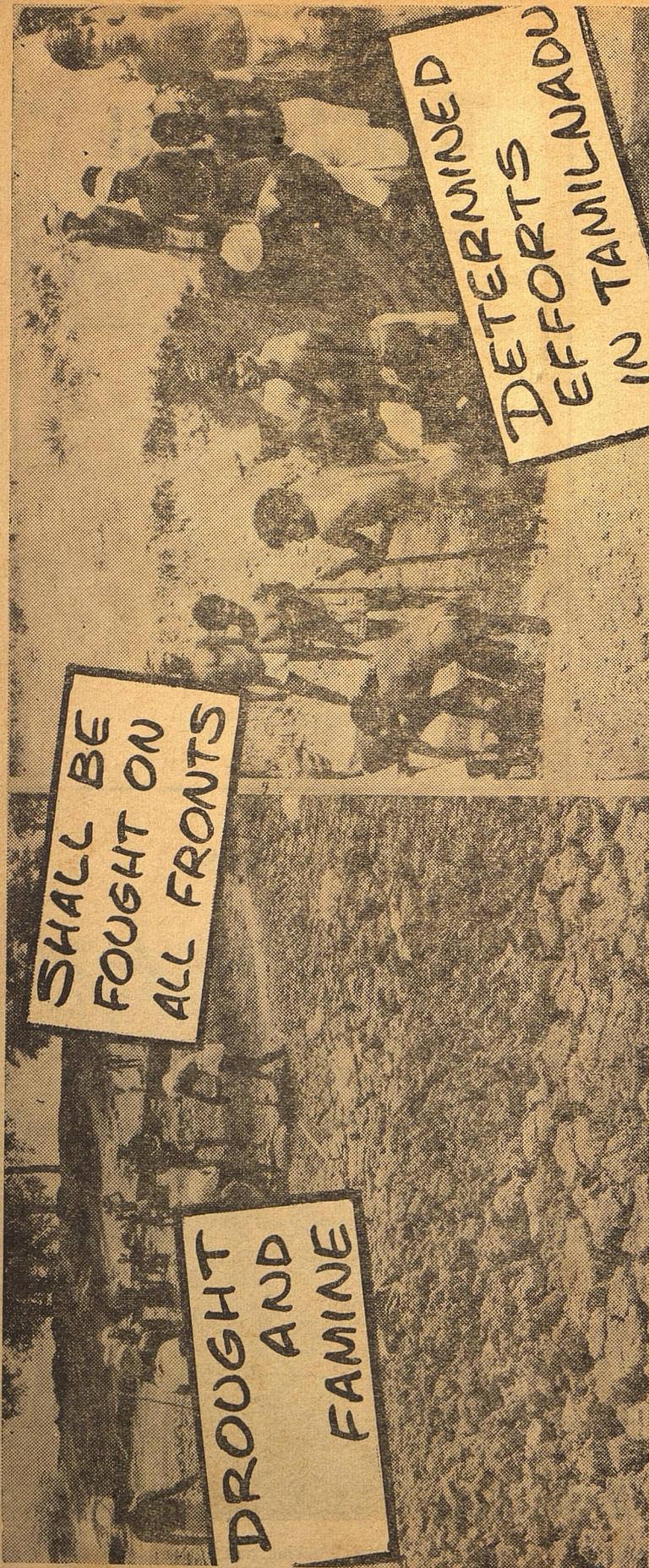
CONTENTS

How drought is fought in Tamilnadu	4
Children's Park, Guindy	7
Women Police go on Beat Duty	13
Madras City Metro-Politan Development Seminar Proceedings	15
Best Crop Varieties for Rabi seasons	21
Siddha System	39
The Musical Instruments of Tamilnadu ..	44

UP IN ARMS



Cadets of Women Police taking part in the Parade on the Republic Day at Madras, smartly shouldering rifles.



RELIEF MEASURES FOR COMBATING THE DROUGHT

Following are the relief measures undertaken for drought-stricken areas :

* A-50 Crore rupee Scheme on Drought Relief on the following 5-point programme to provide employment opportunities and to increase the purchasing power of the villagers affected by drought. They are

- (1) the Rural drinking water supply schemes,
- (2) the Special Minor Irrigation programmes,
- (3) the Road laying works,
- (4) the Irrigation works and
- (5) the Rural works undertaken by the Panchayat Unions, in addition to

* waiving of Kist, local cess and surcharges for wet and dry lands in full.

Deferment of:

- (a) Collection of arrears of Kist to next Fasli,
- (b) Collection of Co-operative dues from agriculturists and

* Conversion of Short-term loan to mid-term by Co-operatives.

Land Mortgage Banks offer -

- (a) Liberal loans to farmers for digging and deepening wells and
- (b) For buying Diesel Engines, Motors and Pumpsets.

* An incentive of Rs. 1,000 granted to agriculturists to buy diesel pumpsets and an additional quota of diesel obtained from Centre for such pumpset users.

* Fresh electric connection for 60,000 pumpsets.

* Full power-supply made available to agriculturists.

* No levy for third crop paddy; easy credit facilities made available through Co-operative for such crops.

* A bonus of Rs. 10/- per quintal for voluntary offer of paddy for levy.

* Moratorium on Farm debts

An Ordinance has been promulgated granting relief to agriculturists in Tamil Nadu, by staying all Court proceedings for debt recovery for a period of one year from 16th January, 1975.

SUMMER PADDY

Summer paddy can give higher yields than kharif paddy due to clear weather during growing season, good sunshine and better water control. Extensive trials conducted

No procurement on summer crop Adequate water supply assured

The Agriculture department proposes to cover about 4.95 lakh to five lakh acres under paddy in the coming summer in Chingleput, North Arcot, South Arcot, Trichi, Tirunelveli, Kanyakumari, Coimbatore Salem, Dharmapuri and Thanjavur districts.

It is also proposed to cover about six lakh acres under pulses in the Cauvery delta.

The district-wise break-up of the acreage to be brought under the summer paddy programme is : Chingleput 1.65 lakh acres ; North Arcot 1.40 lakh acres, South Arcot 70,000 acres, Trichi 30,800 acres, Tirunelveli 4,000 acres ; Kanyakumari 2,000 acres, Coimbatore 30,000 acres, Salem 1,000 acres, Dharmapuri 10,000 acres and Thanjavur 35,000 acres.

The choice of crop variety is being decided with reference to the extent of irrigation availability. Wherever precarious irrigation supply precludes successful paddy cultivation, millet crops will be grown.

Those who are raising this crop have been assured of power supply for not less than six hours during daytime, in addition to the normal supply available at night. They will also be exempted from the levy procurement. It is common knowledge that crops like maize, cholam, cumbu and ragi are definitely better than paddy for growing in the summer season. But the recommendation of the Director of Agriculture to grow summer paddy should be considered in the present context of a very severe crisis in rice production, compared to coarse grains in our State. The rice crisis is exceptional this year like the drought we just now face. The recommendation of the Director of Agriculture is only an appeal to farmers and it does not bind them under any Act or Regulation to take up paddy cultivation. The farmers are at liberty to choose their own remunerative crop. If they select paddy, it is learnt that they will be exempted from levy procurement. Besides this, assurance is being given to extend adequate and continuous power supply to irrigate summer paddy crop.

with photo insensitive varieties at the 'J' Farm near Madras have shown that yields are always highest in summer as also under well irrigation. The summer season is no doubt characterised by paucity of irrigation water and pest attack. But fortunately for us, we have high-yielding varieties that have resistance to pests, tolerance to drought and economical response to lower doses of fertilizer application. These varieties are cosmopolitan in nature and hence can be grown in any tract or season. Rice varieties IR 20 (135 days) or Ratna (109-115 days) or Pusa 2-21 (109days) possessing the above qualities can be selected for the third crop in the Thanjavur district depending upon the irrigation facilities. These varieties are suitable for economical water management also (the fields need not be kept flooded always) and they can to some extent withstand adverse conditions posed by the failure of electric motors resulting in the stoppage of irrigation for a week or so. IR 20 and Ratna are resistant to the deadly stem-borer pest commonly occurring in the summer season. Careful and clean cultivation (removing weeds in the field and keeping bunds free from grass) with choice varieties, would not only make summer paddy a successful crop, but also would prevent pest problem being carried over to the following kuruvai crop.

RELIEF WORKS

Almost all P.W.D. works, including those under SMIP maintenance, minor irrigation etc., scheduled for 1975-76 will be advanced and executed as a special measure to provide employment to the people in drought hit areas in the State. These employment-oriented schemes of P.W.D. will firstly take care of irrigation sources, and road-works will comprise only the second alternative.

Thiru P.U. Shanmugam, Works Minister, who toured nearly 40 villages to inspect the progress of works under the drought relief programme in Arkonam, Ranipet, Arni, Wandawash and Polur taluks had issued

instructions to the P.W.D. authorities to cut down delay in the execution of drought relief programme and simplify the procedures wherever possible.

The Minister saw two major tanks in Timiri block which had not received water for some years. He instructed the P.W.D. authorities to take up the renovation work immediately. He told the authorities that any work taken up should aim at providing permanent facilities to the villages.

FARMS CORPORATION TO BE SET UP

The Tamil Nadu Government has decided to set up a State Farms Corporation for organising agricultural and seed farms in the State. The Corporation will also promote, establish and run seed processing units for agricultural purposes and undertake reclamation and development of lands required for these farms.

The Corporation will have an authorised share capital of Rs. one crore. The State Government has sanctioned Rs. 5 lakhs towards its contribution to the Corporation for 1974-75. The first Board of Directors will consist of Thiru K. Chockalingam, Special Secretary, Agricultural Department, Thiru S. Guhan, Special Secretary, Finance Department and Thiru A. Venkataraman, Director of Agriculture.

The Corporation is expected to set up farms for the production of cereals, millets, pulses and other foodgrains, seeds, fibre, crops, plantation crops, oil-seeds, vegetables, fruits and other crops which are commercially important such as tapioca, maize, pine apple, papaya, banana and spices for supply to markets.

HOUSING SCHEME FOR ADIANDHRAS

The Government of Tamil Nadu have drawn up a scheme to provide houses for "Adi Andhras" in the City.

Under the scheme, houses to be built by the Slum Clearance Board will be allotted to the Adi Andhras Government and municipal corporation lands would be made available to the board at Rs. 3,000 per site for the purpose. It has also been decided to sell on hire purchase the tenements built by the board for the Adi Andhras who are now paying rent.

The Slum Clearance Board will also construct independent houses for Adi Andhras who are prepared to form a co-operative housing society.

PURCHASE OF DIESEL SETS - LOANS AND SUBSIDY NOW AVAILABLE

Revised instructions for issue of Co-operative loans for diesel pumpsets are as follows.

Fresh applications for loans can be entertained or sanctioned if the purpose of the loan involves purchase of diesel sets. The instalments for diesel sets in the sanctioned cases can also be released, if there is feasibility for installing diesel set. The Joint Registrars have been requested to make immediate arrangements to canvass and sanction loan applications for the following purposes :

1. New wells with diesel sets,
2. Deepening of wells with diesel sets and
3. Single purpose diesel sets.

No loan application will however be entertained or sanctioned if dieselisation is not feasible.

The Government have also revived with immediate effect, the grant of a subsidy of Rs. 1,000 (Rupee one thousand only) for each diesel pumpset purchased out of loans sanctioned by the primary land development banks through the Tamil Nadu Agro-Engineering and

Service Co-operative Federation Ltd., The subsidy will be adjusted by the Government in the last 2 instalments at the rate of Rs. 500 in each instalment of the loan due from the borrower to the land development banks. The Joint Registrars have been requested to give wide publicity for sanction of subsidy and see that the maximum number of loan applications is entertained and sanctioned.

No subsidy will be payable on DIESEL SETS purchased outside the Federation but, loans for such sets can be given by land development banks provided they bear I.S.I. mark.

While sanctioning loan for diesel sets, the usual conditions regarding eligibility for loan, repaying capacity, spacing, down-payment, maturity period etc., will have to be duly observed. As the diesel set is routed through the Federation, there may not be any difficulty in ensuring the physical installation of the diesel sets. Instalments for diesel sets will be issued only after the well is completed or nearing completion, but in cases where water is struck earlier

and diesel sets are required for baling out water, the instalments can be released after due verification by the Co-operative Sub-Registrar.

Targets fixed for the issue of loans for diesel sets are as given in the Statement. Each joint Registrar is to see that the target is achieved. The targets indicated in column 6 shall be achieved before 31-3-'73 and those shown in Col. 7 shall be achieved during the period from 1-4-'75 to 30-6-'75. The targets fixed for the normal programme shall however be achieved before 31-3-'75. The Joint Registrars will fix bank-wise targets accordingly.

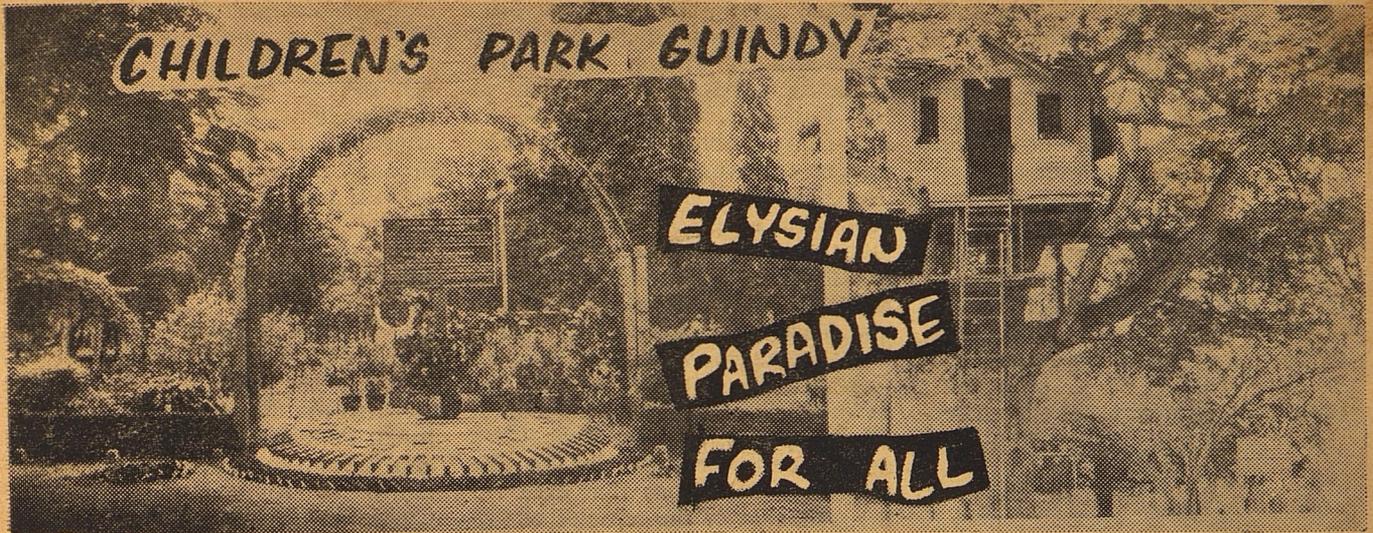
Therefore the Registrar of Co-operative Societies has informed all his subordinate Officers that the need for intensive spade work on their part is paramount to ensure the achievement of the targets fixed and if any Joint Registrar is wanting either in showing substantial progress such lapses will be viewed very seriously.

All the Joint Registrars have been requested to see that the relaxation of the condition given is utilised fully to the maximum advantage of the ryots.

* * *

TARGETS FIXED FOR ISSUE OF LOANS FOR DIESEL SETS

Name of the District	Normal	A.R.C.	I.D.A.	Total	To be achieved before	Balance to be achieved during the period
					31-3-'75	from 1-4-'75 to 30-6-'75
1. Chingleput ..	54	662	631	1,347	900	447
2. North Arcot ..	95	400	2,060	2,555	1,700	855
3. South Arcot ..	63	2,250	..	2,313	1,500	813
4. Thanjavur ..	122	..	1,000	1,122	800	322
5. Tiruchy ..	132	400	..	532	350	182
6. Pudukottai ..	105	800	..	905	600	305
7. Madurai ..	114	300	..	414	340	74
8. Ramanad ..	55	2,200	..	2,255	1,500	755
9. Tirunelveli ..	267	1,600	..	1,867	1,240	627
10. Kanyakumari ..	36	..	..	36	36	..
11. Salem ..	..	..	850	850	600	250
12. Dharmapuri ..	..	..	1,776	1,776	1,190	586
13. Coimbatore ..	167	..	..	167	167	..
14. Nilgiris ..	7	..	..	7	7	..
Total ..	1,217	8,612	6,317	16,146	10,930	5,216



“ We must learn to love nature and feel one with it. I wonder how many people these days know the names of different kinds of trees, flowers, animals and birds. Once you know the names you get closer to them. If you recognise the voice of a particular animal you establish a personal relationship with it.” So observed Pandit Nehru, and if his esteemed words are to be heeded, we in Madras have an unique opportunity at the Guindy Deer Park which is an ineffable sylvan Paradise. It is unique because it is uncommon to have a forest amidst a metropolitan city. To locate a deer park with a Children's Corner and Snake Park in it is something rare for us in India, though such deer parks characterise every important city in Europe. No wonder it is growing more and more popular.

Paradise is a Persian word meaning a garden or a royal park and occurs as a name for the garden of Eden, in the Book of Genesis in the Old Testament. Those who do good will go to paradise, said a prophet and how correct, apt, meaningful and clinching it is to describe this lovely park as a paradise.

History of the Park

Prior to becoming State-owned in 1817, the entire 1,262 acres of the “ Guindy Lodge ” (as it was then called) was under private ownership of Mr. Gilbert Ricketts, and from 1825 it became the country residence and week-end resort of the Governor of Madras.

The Government of Madras (in their notification No. 157 dated 22—3—1910) constituted the Guindy Park from 1—10—1910 as a “ reserved forest ” under the provisions of the Madras Forest Act of 1882. In 1947 it became the Raj Bhavan, the permanent residence of the Governor of Madras. The Comptroller of Governor's Household acted as the District Forest Officer for the purposes of the Forest Act and the entire estate was managed as a reserved forest.

Being actuated by an altruistic sense of self-abnegation and munificence and as a measure of austerity the then Governor of Madras Mr. A. J. John decided to hand over about 1,002 acres of the Guindy Park Reserved Forest to the Government, himself retaining about 260 acres for the Raj Bhavan Estate. Since the Prime Minister was personally interested in the improvement and preservation of the park as such as a deer park, the Governor took his prior approval for such a measure. The Guindy Park had a deer population of about 300 numbers and an equal number of black duck at the time of the transfer to Government. The transfer was effected from 1—3—1958. An area of 383 acres on the eastern portion of the park was handed over for the establishment of Indian Institute of Technology and was unreserved (in G.O. 3308, Food and Agriculture, dated 14—9—1961) leaving about 879 acres for the Guindy Park reserved forest including 260 acres for the Raj Bhavan Estate. Thus the area came to be under the Forest Department of this State and formed a part of Tambaram range of Saida-

pet division. With effect from 20—10—1959 on the formation of the State Wildlife Organisation, the Guindy Park was constituted as a separate unit under the State Wild Life Officer from 1—7—1960 with a Superintendent in-charge. Recently an area of about 6 acres for the Cancer Institute, on the eastern side and about 20 acres for the Guranak College on the western side have been set apart, which will further reduce the area of Guindy Park Reserved Forest which has already shrunk considerably. With what levity we look upon this nature treasure of ours is evidenced by the fact that there is continuous glamour for uneservation for various other purposes. We have been all along watching helplessly the vanishing of this metropolitan wilderness.

Vegetation : The Guindy Park Reserved Forest (or the Guindy Deer Park) is perhaps the only one left today to carry a relict vegetation of a truly representative natural thorn scrub jungle of our southern zone. It has an abundance of varied species such as *Zizyphus jujuba*, *Dichrostachys cinerea*, *Carissa spinarum*, *Flacourtia* species, *Randia* species, *Anacia* species, *Capparis* species etc. Scattered large trees of *Eugenia jambolana*, *Feronia elephantum*, *Peltophorum ferrugineum*, *Millingtonia hortensis*, *Lanea grandis*, *Ficus* species, *Aegle marmelos*, *Bassia latifolia* etc., also occur. It is gratifying to note that the natural vegetation is well preserved and is typically indigenous, though a few ornamental and fruit trees have been introduced. Over a century the fauna and flora of this exquisite nature preserve have enjoy-

ed the care and protection of many naturalists who, though anxious to continue their labour, are a sad witness of all their endeavours being slowly eroded. Their prayers can only be that this pretty little forest may live long and for ever.

“What would be the world be, once bereft
Of wet and wilderness? Let them be left,
Of let them be left, wilderness and wet;
Long live the weeds and the wilderness yet.”

—G. M. HOPKINS.

Water Supply

There are quite a few small tanks in the park such as the Appalam Kulam, Kanagam tank, Kathan Kottai tank, etc., providing source of water supply for the animals, but sadly enough the park is a waterless tract and even permanent wells have proved difficult to construct. The few ponds in the area dry up during the hot weather, compelling the animals to stray away far outside the park in quest of water.

Wild Life

Besides spotted deer and the black buck, the Guindy Park reserve has a proud possession of a variety of animals, birds and reptiles such as the bonnet monkey, civet cats, the common mongoose, hares and

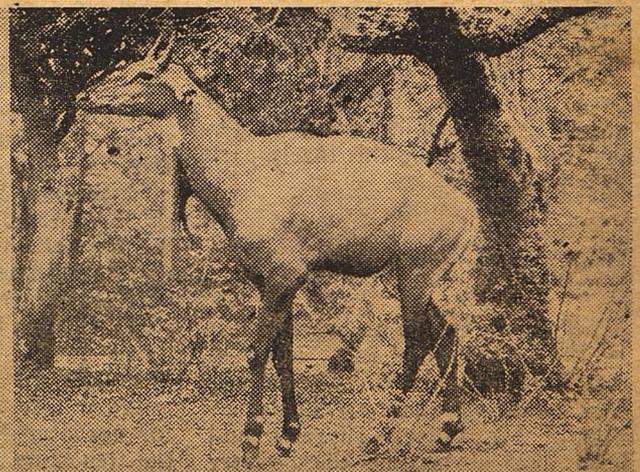
rodents among animals and Bush larks, partridges, quails, bee eaters and cuckoos among birds. The black buck popularly known as the Indian Antelope is quite an interesting animal found nowhere else in the world except in India. The Deer Park at Guindy and the Kodikarai Reserved Forest in Thanjavur are the two abodes for this vanishing asset in our State. The abundant incidence of spotted deer and black buck in the Guindy Park is at variance with the accepted view of many a naturalist that this scrub jungle is not the normal habitat of the species, and yet they thrive and flourish perhaps due to the propitious conditions that exist for the wellbeing of the species in this park. In 1961 a census was conducted by the Wild Life Organisation and it was found that there were 532 black buck and 504 spotted deer in this reserve, and it may be that now the number is much more. It is not definitely known when the deer and black buck were introduced into the Guindy Park reserve but it is a great satisfaction to find that this measure has proved quite successful and a great attraction for tourists and local population alike in Madras City.

In 1961 action was initiated to declare the Guindy Park Reserve as a national park in order that it may irrevocably become a permanent wildlife sanctuary, that its natural features may be more effectively protected, that it may acquire a higher status in the eyes of the people and that it may become an institution of national importance receiving publicity attracting visitors

and tourists from abroad. During 1964 the provisions of the Indian Wild Bird and Animals Protection Act of 1912 was made applicable to the Guindy Park and the entire area upto a radius of 20 km was declared as protected, and shooting of wild animals was prohibited.

The Children's Corner

In 1958, when it was proposed to transfer the Guindy Park reserved forest to the control of the Forest Department, the Prime Minister of India, Pandit Nehru hoped that the area would be improved and maintained as a deer park with a Children's Park in it. Indifference to his wishes the Forest Department set apart an area of 14 acres on the north eastern corner near the Gandhi Memorial for the Children's Corner. Within a short period of one year, the Prime Minister's desire was carried out. Work on the Children's Corner commenced in January, 1959 under the valuable guidance of a Committee of distinguished personalities and in April 1959, the Prime Minister himself inaugurated the Children's Corner and to mark the occasion he had planted a peepul tree in the precincts of the park, which is a magnificent sight to witness, bringing back happy memories of the great Prime Minister and our sentiments that he is just not amongst us to witness the growing nature of this wonderful garden. The children particularly owe it to his great vision, dynamism and lofty ideals. In keeping with the twin objectives of the Children's Corner as can be seen are the necessity to afford the conventional



Deers in the Guindy Park in its natural surroundings, grazing under cool shady trees

means of recreation and to afford facilities for developing an abiding interest Nature Study. There are quite a number of play things for the children to enjoy and a number of caged animals and birds for the children to watch. The well fed sloth bear cubs, the panther, the flying squirrels, the sarus cranes, the flamingo, the duck, the small terns, the pelicans, the snake bird, the lovely stork, the Sambhar, the spotted deer, the multicoloured parakeet, the python are some of the wonderful animals, birds and reptiles which are kept in the Corner giving a thrill to the atmosphere, and children particularly are indeed enthralled by the exciting scenery which they perceive from the beautiful watch tower. There is an open air theatre where films are exhibited a few days in a month, and a children's library with interesting books. Labels have been put up to enable children to know the trees and plants and animals around them by their common names. There are tree top huts for the kids to climb up and sit.

On the Children's Day in 1962, the children of Madras to their great delight and cheer witnessed for the first time the midget train with 9 carriages capable of accom-

modating 100 children hauled by a streamlined little diesel locomotive, stream out on its maiden run round the 3,000 feet circular track round the corner taking about 9 minutes to complete the round. The riders can have a full panoramic view of the beautiful park with its gay coloured birds and spotted deer. The train is run on two days in a month on second Saturdays and Sundays. Nearly 600 people use this train every day. Mekala the young elephant helps the kids to enjoy a ride which they really love to.

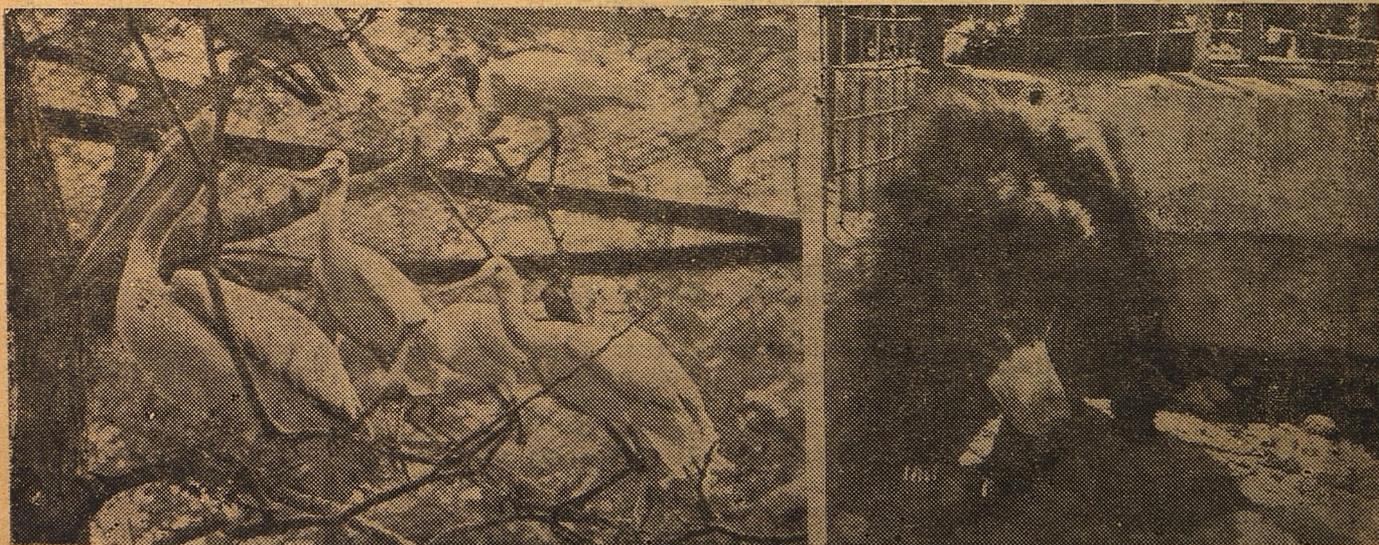
Children of Madras are really lucky in that this park has invited international attention and everyday is a day of improvement and increasing facility for them to learn many more things of nature and become useful citizens of the country.

The Snake Park

Yet another interesting feature is the Snake Park a leased area of one acre near the Children's Corner in the Guindy Park run by Mr. Romulus Whitaker. This Snake Park and reptile research centre came into being by the middle of 1971 and has a variety of snakes from poisonous King Cobra to the innocuous water snakes.

An effort was made in 1961 by the Madras Corporation to shift the zoo to the Guindy Park area but very rightly it struck to the thinking men at the helm of affairs and members of the public that it would be suicidal to take such an infructuous step to house the zoo in the park in view of the fact that the serenity of the park which is a vital factor would be totally lost.

We in Madras are quite conscious of the increasing environmental pollution brought about by increasing industrialisation and are always in the look out for tranquility and respite in fresh air. Will it not be imbecile to talk much and do next to nothing to attain? Here is an opportunity: Let us not allow the Guindy Park to become one more memory of our hoary past. A brochure issued by the World Wild Life Fund says about Guindy Park "It is the home of many wild species, a valuable tourist attraction, a jungle laboratory, unique, cool, quiet, refuge and a sole surviving remnant of a coastal jungle. It is worth the time, effort and money to maintain it a jungle for ever; 1,200 acres of jungle to mere 600 acres; this is all that is left. Can we save it? Think it over!



Pelicanbirds (left) and bear in the right are the absorbing attractions of the Children's Park, Guindy

Koonthakulam

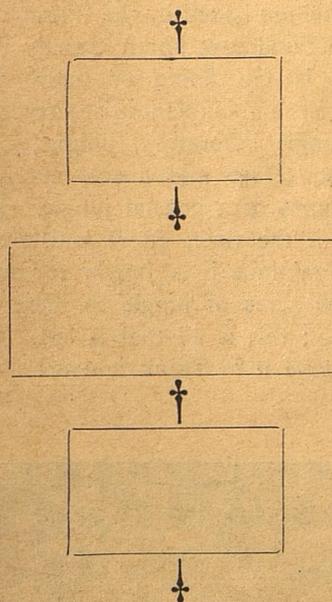
Our Little

Known

Heronry

Of

Tamil Nadu



By
Thiru J. Mangalraj,
Jhonsan,
Divisional Forest Officer,
Forest Resources
Survey Division,
Madurai.

Snugamid the green, green fields of Tirunelveli lies the pleasant little village of Koonthakulam, where the sky looks bluest, the air breathes sweetest and pastoral peace of the last century still persists. About a thousand pairs of water birds visit this place, build their nests on the trees within compounds of houses and on the nearby fields.

The paddy fields, are owned mostly by the Telugu speaking vegetarian Pannaiyars, who are said to have migrated from Andhra Pradesh some three hundred years back, during a famine. They had been all along the anxious caretakers and cautious custodians of the breeding birds and had prevented the other meat-eating communities from molesting nests and nestlings. Anyone found to have harmed or killed a fledgling was taken in a procession around the village with the dead bird tied around his neck. Such punishment effectively provided protection. Now of course, everyone is proud of the unique privilege of playing host to the breeding birds and is happy to be resident of the chosen village.

The Koonthakulam tank is fed by Manimuthar channel and normally contains water enough for one paddy crop only. A second crop is possible only during years when water is available for longer periods in the tank. The water birds instinctly know these years and nest in large number, continuing this breeding activity longer than usual. This is what the villagers believe, and they welcome the birds breeding in large numbers as it is a sign of a second crop.

Assurance of availability of adequate aquatic food, protection from predators, occurrence of suitable host trees and accessibility to nesting materials, chiefly influence water birds in their initial choice, for their communal breedings. Once a site is chosen and utilised for some years the future generations persist inspite of human interference and disturbance. Birds start arriving here, usually, by the middle of November and stay till April of the following year after completing their breeding. Nigh heron (*Nycticorax nycticorax* (Linnaeus), Little egret, *Egretta garzette* (Linnaeus), Cattle egret (*Babulcas idis*) (Linnaeus) and Painted stork *Ibis leucocephalus* (Pennant) nest here. Night herons—Cattle egret—Little egret—Painted stork is the arrival order of birds here and they start their nest building

on the trees within the house compounds in the heart of the village, spreading their activities to the four car-streets, then beyond, gradually to the closeby fields. Painted storks nest only on the tree fringes of the village. The host trees are Neem, Tamarind, Coconut and Ficus. Though there are Palmyra trees, no nest was found on them probably due to the disturbance caused by the tappers, who climb daily to collect the palm sap. The leaves, branches and trunks are whitened by the birds' droppings. The nests are shallow stick platforms without any lining, except for some green leaves used in some cases. The materials are collected from faggots, fences and bushes. Collection from the host trees are avoided, though they contain dead branches.

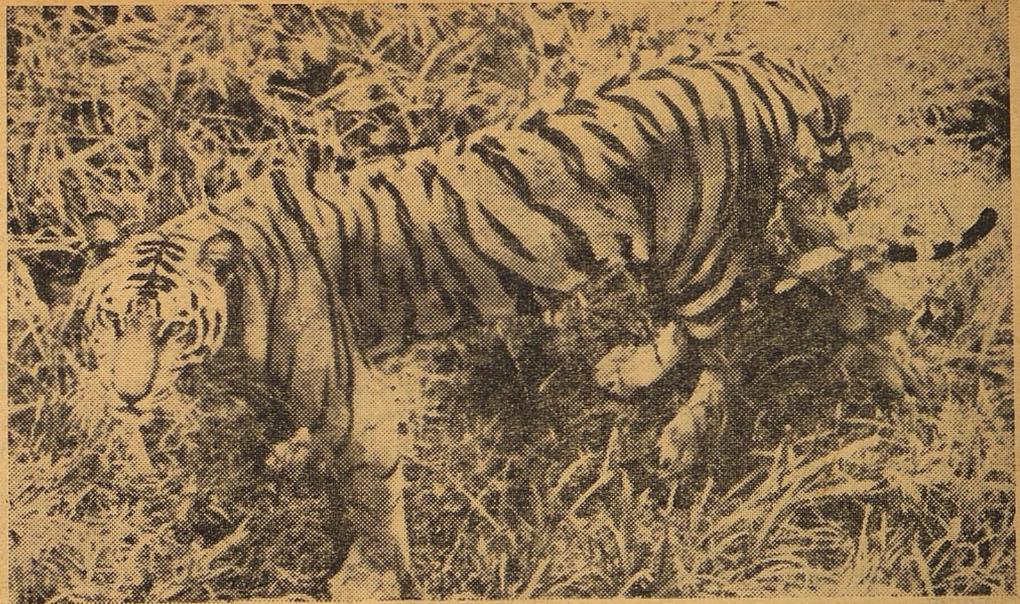
Koonthakulam and other tanks in the neighbourhood and the rain inundated shallow lands and sheets of water with aquatic fry, provide the fantastic quantity of food required for the insatiable mouths of the young. During March-April, the parent birds bring fish from the Arabian Sea, 20 miles away, as the stork flies. The regurgitated food frequently falls to the ground and sea fishes are found only during late March and April, when tanks and water logged flats become dry. Painted storks bring grey water snakes, which squirm and fall out of the nests down on the ground. Crows and Kites are the common predacious birds. The Kites remove nestlings and regurgitated food fallen out of the nests, while crows pester the parent birds on the nests and steel away eggs, fledglings and regurgitated food. House cats are accountable for casualties in the young.

The fertilising property of the birds' droppings available in great quantities is known and used by the villagers. Periodically basketfuls of the excreta are collected from beneath the nests and used as manure, mostly in vegetable gardens.

Such a congregation of birds and incessant breeding activities over homes are a nuisance to put it mildly. Thorny twigs in roads and courtyards, dead tadpoles and fishes before a vegetarian's kitchen, many voices, making a bedlam day and night, bird excrement defecated on clean dresses and the nauseating stink around the nests cannot be very welcome! But these are cheerfully taken here as part of life.

If your want
the Tiger to
survive....

MAKE THE INDIAN TIGER HAPPY



The Indian tiger, "*Panthera tigris tigris*" took its origin from Manchuria and migrated to India, passing through Malaya, Burma and **Bangladesh**. From Himalayan region it moved towards South. There are series of fossils in various localities to support and establish these facts. Tiger finds a place even in the ancient Hindu Veda scriptures. There are references about tigers in Tamil literatures. The famous Chola emperors inscribed the tiger in their flags and banners. In Indian States, Uttar Pradesh, Rajasthan, Maharashtra, Madhya Pradesh, Bihar, Orissa, West Bengal, Assam, Karnataka, Kerala and Tamil Nadu are infested with tiger population. The Mudumalai and Mundanthurai forests in Tamil Nadu are the shelter bases of Indian tigers. Their movements are restricted and confined to these two places in the State. It was estimated that in Asia alone there were one lakh tigers before First World War but, the present position is completely on the reverse being only 5,000 tigers. In 1930 the tiger population in India had reached 40,000 and subsequently the number of tigers declined to 2,800 during 1968. In 1972 it was further reduced to 1,827 tigers. It is paining to note that this magnificent carnivora had been over exploited and under fear of extinction.

Habit and Habitat : The tiger prefers dense vegetative cover adjoining water courses, reed beds and thick grassy patches bordering ever-green forests. It avoids hot weather

and never moves completely away from the water sources. During summer days it swims in the streams every now and then in order to bring down the heat of the body.

The tiger is nocturnal in its habit and rarely hunts during day time. It may travel covering a distance of 35 K.M. in search of prey in a night and maintains territory of its own. It will not allow other tiger to enter upon its territory.

Physical Structures : An adult male tiger is measured 3 feet in height at shoulder and 5 feet girth. The girth of the neck is usually 3 feet and fore-limbs measuring 20 inches. The canine tooth may be 3 inches and that of claw is 2 inches. The average weight of a healthy male tiger may be 200—250 kgs. and that of tigress is 150 kgs. The average length of tiger is from 9 feet to 9.6 feet and the tigress measured 8 feet. The scientific method of measuring a tiger is the straight line between the tip of the tail to the tip of the nose.

Feeding Habit : The tiger starts hunting between dusk and dawn. It will not chase the animal but moves slowly under grass, approaches by stealth and with short rush gets hold the neck or throat of the victim and makes it fall on the ground. The tiger will not leave the grip until the animal is completely dead. It usually preys on spotted deers, sambars, small bison, wild boar, porcupine, etc.

The skin of the tiger is rich orange with black stripes from head to tail and this helps the animal to hide in the bush and make a sudden rush in its prey. With large canine teeth it breaks the neck portion of the victim. The fore-limbs play an important role at the time of killing its prey. They not only give a deadly blow to the animal but also prevent the same from escaping the firm grip of the tiger. After killing the prey the tiger commences feeding from the rear leaving the head, stomach bag and intestine. The small luns are crushed and swallowed along with the flesh. The tiger consumes more than 30 kg. of meat at a time or about one fifth of its own weight. One fully grown bull will be sufficient for three days.

Breeding and Caretaking : The tiger is leading a solitary life and will not move in herds except during breeding season. It is not a social animal like lion which lives with family. In India the mating season varies from place to place and very often takes place during winter season. The gestation period is from fifteen to sixteen weeks. Usually 2 to 6 cubs are delivered at a litter. The cubs grow rapidly and within six months they attain the size of a dog. At the age of three they are fully grown and hunt themselves without their mother. The tigress protects and defends its cubs from external attack. There are instances of the cubs being killed by the male tiger when they are young.

The Man-Eaters : The tiger turns into man-eater under the following circumstances. When the tiger becomes old or suffers bad injuries it may not be successful in hunting. Sometimes as viewed by Jim Corbett — a shikari turned to conservationist—the bullet injuries left by a poacher leads the tiger to become man-eater out of vengeance. It tries to attack whoever comes in contact with it. Once the tiger relishes the human blood it may not go for other animals. According to Mr. Guy Mountfort, — a tiger conservationist 275 men were known to have died by man-eating tigers during the past ten years in Sunderbans forests. In several instances the women were the target for attack by the man-eaters. They are said to be highly intelligent and cunning.

Tiger—the endangered animal : The growth of human population indirectly arrests and affects the tiger population in India. Due to explosion of population vast extent of forest areas are cleared for human inhabitation. People dwelling in rural areas start settling in hilly tracts for agricultural purposes. As a result, the natural balance is disturbed to the great extent and the animal entirely depending upon the environment have to leave the place in search of new shelter. The Indian Maharajahs, the British rulers, few Military Officers and tea planters were responsible for the large scale destruction of Indian tigers. One Indian Maharajah took pleasure in shooting 1,150 tigers. According to Mr. Burton, a naturalist a total of 1,579 tigers were shot in British India in 1877. Between 1820—28 an average of 138 tigers were shot annually in Bombay Presidency alone. Mr. Chaturvedi an authority for Indian tiger—gives a clear picture that an average of 280 tigers were destroyed annually from 1934-54 in India.

The invention of powerful fire arms chiefly the rifler barrel and smokeless powder, jeep, head search light, spot light etc., contributed much for the disappea-

rance of tigers from Indian forests. The poachers by hunting Sambar, Chital, wild pig, porcupine etc., had created artificial scarcity among the tigers, resulting large scale mortality. The farmers residing adjoining forests are supplied with large quantity of toxic-chemicals such as Folidol, Dieldrine, Endrin etc., for cultivation purposes. Whenever their cattle are attacked and killed by tigers, they simply smear the folidol on the remains of the carcass and put an end to the tiger population. It is estimated that 32 tigers died from folidol poisoning in eighteen months in the State of **Madhya Pradesh**. In the recent past the tiger was chiefly persecuted for the highly priced its skin. There was constant demand for tiger's skin from England, United States of America etc. The skin is mainly used for the manufacture of fancy articles such as fur coat hand bags for ladies etc.

Need for preservation : It is the high time that effective and earnest steps to be initiated to preserve and conserve the vanishing Indian tiger for the benefit of future generation. As a matter of fact the tiger has got religious, economic and aesthetic value like other wild animals. The Indian tiger is a dollar earner from the tourist point of view which attracts many from abroad.

The mass should be enlightened the importance of tiger preservation through well organised State wide

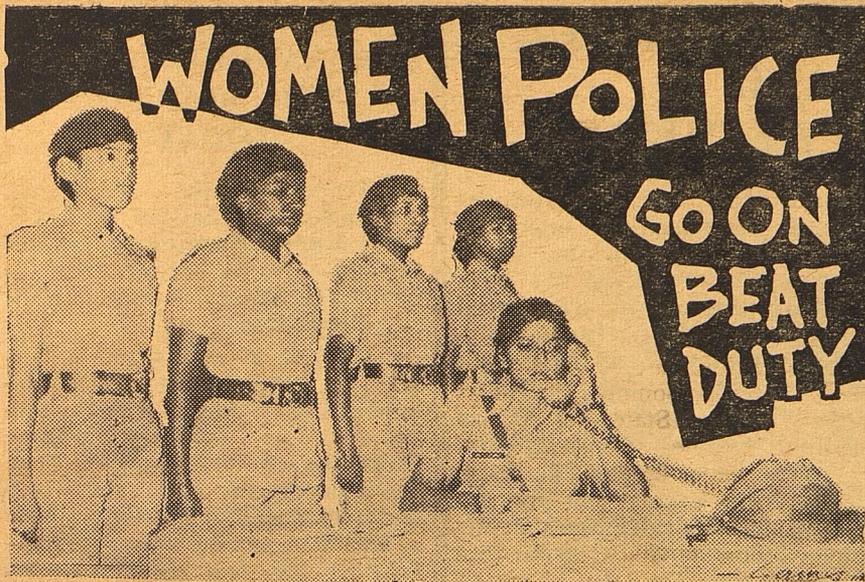
campaign. The educational institutions have to play a significant role by making "Wild Life" as a compulsory subject in the syllabus. The formation of District-wise "Wild Life Association" could solve many problems facing wild life administration, "Tirunelveli North, South Wild Life Preservation Association" a newly established association paid compensation amount of Rs. 2,435/- to cowherds towards the loss of cattle which were killed by tigers and panthers. The Government of India through legislation not only prohibit shooting of tigers but also ban the export of tiger's skin. It is a matter of appreciation that United States, Russia and Britain have taken concrete steps to ban the import of tiger's skin from other countries. The Gover of Tamil Nadu was the first State to constitute a Tiger Sanctuary at Mundanthurai in Tirunelveli District over an extent of 520 sq. km. The Government also paying compensation for the cattle killed by the tigers in Mundanthurai Tiger Sanctuary with a view to save the existing tiger population from the cruel act of poisoning by the ryots. The Mudumalai and Mundanthurai Sanctuaries are being scientifically managed with the object of protecting and improving the surviving tiger population by the Government of Tamil Nadu.

By

Thiru PARAMASIVAM, RANGER,
Statistical Cell, Madras.



The Lion is a social animal always found in family or group. Photo above shows a family living in Mudumalai Wildlife Sanctuary.



Women Police have come out on beat duty in the City commencing from 1st January, 1975. The induction of women into the Police Force may well be taken as our symbolic gesture to the International Women's year.

Social Service Organisations like Guild of Service etc., have for long been pressing the Police Department and the Government for sanction of a squad of Women Police. The matter was postponed for the reason that no suitable women were forthcoming for the post. It was also felt that the service of Women Police is a *sine-qua-non* to attend certain category of services which the public is indeed in need of and those duties which our present men police cannot attend to without embarrassment in case a woman is involved. The Women Police squad in Tamil Nadu was inaugurated on 1st November, 1974.

As a tentative attempt this new squad would discharge duties round the Madras City. For this purpose Tamil Nadu Government have sanc-

tioned one woman Sub-Inspector of Police, one Woman Head Constable and 20 Women Police Constables Grade II to perform function within the city. The Chief Minister of Tamil Nadu has also promised that Women Police contingents would also begin to work soon in Tiruchi, Coimbatore and Madurai districts.

After recruitment the members of the Women Police squad have gone through an intensive training which included "Karate" for self-defence. Their karate skill was on display on the Inauguration day where they broke a burnt brick with a single karate stroke which awed and thrilled V.I.P. and spectators alike.

The Government has directed the Women Police to discharge following work schedule :

1. Patrolling areas where undesirable women frequent.
2. Rescue of young girls found homeless and in danger of becoming prostitutes.

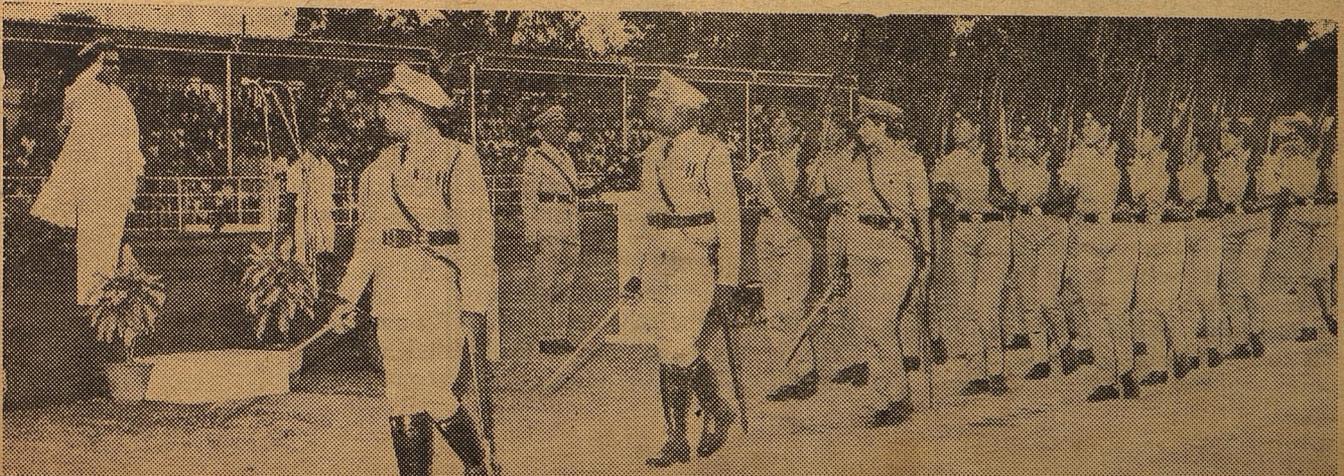
3. Accompanying police on Immoral Traffic Act raids.
4. Escorting to Court and guarding in Court, female prisoners.
5. Assisting investigating officers and questioning complaints in cases such as assaults on women and children.
6. Dealing with stray children.
7. Bandobust duties at large gatherings where women congregates e.g., big public meetings and festivals where there are separate women enclosures.

The Training Schedule as well as actual training was imparted by P.R.S. Kilpauk staff under the command of Thiru R. Kaliappan, I.P.S., Deputy Commissioner of Police, Head Quarters. However the credit for devising some specific Training Schedules to augment the trainees physical and mental powers to suit the needs of the Police Force, goes to Thiru K. R. Shenai, Commissioner of Police and Additional Inspector-General. Horse riding also formed part of the schedule for some among the women Constables. Karate training was given to them by Karate Master Thiru Tam. Mani.

All the Women Police Constables have passed S.S.L.C. and their pay in Rs. 150 per month. The qualification for Grade I Police Constable is S.S.L.C. passed and their pay is Rs. 200 per month. Government have the proposal to treat the Women Police Constables as Grade I PCs and grant pay of Rs. 200 per month.

Thus women's participation from the Parliament administration down to the administration of Law and Justice in the society is quite encouraging and what Tamil poet Subramania Bharathiar dreamt about the modern women have come true in our age. *

Dr. Kalignar taking the Salute at a parade by Women Police Force on the Induction day of 1st November 1974



DELHI JOURNAL'S PRAISE FOR TAMIL NADU SOCIAL SECURITY SCHEME

A NOVEL social security scheme sponsored by the Tamil Nadu Government and inaugurated by Union Finance Minister C. Subramaniam during Deepavali in Madras provides a monthly pension for thirty years and a lump sum at the end of it in return for a small but regular monthly payment during one's working life.

This is the first of its kind in the country and it does not restrict age limit and welcomes all people including children on whose behalf accounts can be opened. This was described as a scheme providing security in old age. It extends the principle of security in old age, in return for a small monthly deposit regularly for wage-earners, self-employed who can join any one of the seven types of subscription.

A sum of Rs. 10 per month for ten years would entitle the subscriber Rs. 20 monthly pension and a lump sum payment of Rs. 1,500 at the end of the pension period ; Rs. 10 monthly for 15 years would bring Rs. 35 monthly pension and Rs. 2,500 lump sum at the end of the pension period ; likewise, Rs. 10 for 20 years would increase the pension to Rs. 60 per month as also the lump sum payment to Rs. 4,000 at the end of the period.

For twentyfive years the same amount would fetch Rs. 100 pension per month besides Rs. 5,500 lump sum at the end of the period ; but a sum of Rs. 20 per month for 20 years will entitle a subscriber to Rs. 100 monthly pension and a lump sum of Rs. 8,000 after the pension period. Rs. 30 per month for 15 years also can entitle the accountee to Rs. 100 per month and Rs. 8,000 at the end of the period ; Rs. 60 per month for 10 years would enable the subscriber to obtain a pension of Rs. 100 per month and Rs. 9,500 at the end of the pension period.

The Tamil Nadu Government will meet the administrative expenses and it would invest the collections on this account on a no-profit basis. Union Finance Minister commended the scheme as "novel and unique". This scheme would help the State Government in considerably helping its further industrialisation projects through purposive investment. Stating that the Central Government

had also made such social security schemes, Subramaniam uttered a word of caution that the State's schemes generally should not work at cross purposes with the Central Government's plans. He did not, however, mention how the present social security scheme of Tamil Nadu worked against any of the Central Government's similar scheme.

While understanding the desire of the State Government for improving developmental work in the region, Subramaniam observed that the States should not fail to appreciate the problems of the Centre when the States' schemes conflicted with those of the Centre. The closest co-operation between the Centre and the States was suggested by him in executing such social security schemes. Such schemes, Subramaniam did not fail to point out, should have to be implemented without any party bias.

State Governor K. K. Shah, joined Subramaniam in commending the scheme as "unique" and "that it would pay the ruling party rich dividends politically." Governor Shah viewed that to an extent this scheme would free the common man from pressures that prevented him from exercising his voting right freely. This would lead, he noted, to what he believed to be massive collective capital formation that could be used for productive purposes by the States and the people actually becoming collective partners in a sort of co-operative venture.

Chief Minister M. Karunanidhi referred to many of the egalitarian schemes of the Tamil Nadu Government and welcomed the ideas of both the Union Finance Minister and Governor Shah that no political bias should influence the working of the scheme. He, nevertheless, conceded that his was a political party which had also elections in mind, but he noted that "we should also think of the next generation". He assured the fullest co-operation of Tamil Nadu with the Centre and in fact, he added, the State had been co-operating in every scheme the Centre had initiated. Thirtytwo banks including nationalised ones are participating in the scheme.

—"THE STATES" a New Delhi Fortnightly, 7th December, 1974.

THE IDEAL POLITICIAN— KARUNANIDHI IS WHAT INDIA REQUIRES TODAY

While reviewing the book "Karunanidhi, Man of Destiny", Thiru Ka. Na. Subramanyam writes as follows in the I.N.F.A. publication "The States" founded by the late Durga Das.

"Quick at retorts and equally quick at making even crucial decisions, Karunanidhi's rise to eminence as Chief Minister of Tamil Nadu, the only non-Congress State Government in India, is worth studying as evidence of the political awareness among the masses. Whether the term mass-leader fits other leaders or not, it does fit Karunanidhi like a glove.

"Ten years ago no one could have predicted the rise of this particular star in the horizon much less the durability of it. From the log cabin to White House seemed a familiar description of the rise of originally obscure men of small mean to great heights as Presidents of America. In a like manner a description of Karunanidhi as having risen from the streets of Tiruvarur to the heights at Madras might very well be an informing and heartening study.

"In thirteen chapters the biographer outlines the rise of the DMK and Karunanidhi as its undisputed leader in the circumstances of Madras politics. Both as Opposition leader and as Treasury leader, Karunanidhi was and has been an able and reckonable leader and he was quite a good lieutenant of the more charismatic Anna, but with the disappearance of Anna the chance came to Karunanidhi to demonstrate his capabilities to the full and one cannot say that he has not demonstrated it fully, convincingly and ably."

"Pragmatic, alert and not unduly oversensitive, Karunanidhi is an ideal politician, what India requires today."

"When Anna rose to the occasion, impressively turning an able leader of a party in power overnight, Karunanidhi could by then, if not earlier, be recognised as the second in command and with the death of Anna, Karunanidhi had occasion to demonstrate his ability to take command and exercise command ; he has done both unenviably to a certain extent."

Inaugural Address by Dr. M. Karunanidhi, Chief Minister at the Seminar on Metropolitan Development Planning and Regional Planning on 6th January, 1975.

Madras as such at present consists of 25 per cent of the urban population of the State and 27 per cent of all industrial workers of Tamil Nadu. The future population of this rapidly growing metropolis is expected to reach a figure of 5.82 million by the year 1991. The high growth rate of this urban population, if allowed, to continue without a carefully prepared plan, is bound to create problems arising out of unplanned and uncoordinated physical developments. A metropolitan planning and development strategy has a key role to contain the growth of the metropolis and to enforce orderly development of the area.

I understand that the Madras Metropolitan Development Authority has a programme to develop urban nodes within the Metropolitan Area along the corridors of development, to absorb a significant portion of the anticipated increase in population. The Authority has also undertaken development of one of the Satellite towns, namely Maraimalai Nagar at a distance of about 40 kilometres from the city as part of the overall metropolitan development programme. I also understand that this authority is engaged in the ambitious programmes relating to Anna Salai re-development, re-development of Broadway Bus-stand, beautification of Marina and a Pilot Project for urban renewal in the George Town area. The Directorate of Town and Country Planning has also finalised a comprehensive traffic and transportation plan with a view to cater to the massive urban population within the Madras Metropolitan area. This plan includes proposals for the development of road net work, road transport and a mass rapid transit system through the city centre.

It is but proper that this Seminar should discuss the Madras-Chingleput Regional Plan along with the Metropolitan Plan for Madras City, since planning of any metropolis will not succeed, unless it is co-ordinated with the wider perspective of a region. The United Nations have estimated that the world population

Equate MADRAS with BOMBAY and CALCUTTA



C. M.'s PLEA ON METROPOLITAN ALLOCATIONS

will double itself within a period of 20 to 30 years and that there is going to be an unprecedented urbanisation with large migration from rural areas. With a view to achieve a balanced development of the urban and rural areas in the State and to plan future disposition of both urban and rural population, the Government have decided on the policy of *regional planning for the State*. Tamil Nadu is perhaps the only State which has brought the entire State under regional physical planning. The State has been delineated into eight planning regions for the purpose and the Madras-Chingleput region is one of them. Due to the pre-eminence of the Madras Metropolitan Area,

this region is the most important among the regions in the State and has peculiar planning problems of its own. The development of this region is very much linked to the development of Madras Metropolitan Area. While the Madras Metropolitan Area has its influence throughout the State and beyond, its influence over this region is considerable and its planning has to be considered along with the developments contemplated for Madras Metropolitan Area.

The studies carried out by the Directorate of Town and Country Planning have highlighted the fact that nearly 90 per cent of the urban population of the region and more than 95 per cent of the industrial establishments are located within the Madras Metropolitan Area indicating low degree of development in the region outside the Madras Metropolitan Area, resulting in the backwardness of the region. This calls for immediate corrective measures as otherwise the Metropolitan Area will deplete the rest of the region and find itself surrounded by a vast economically backward area. The medium towns around the Madras Metropolitan Area like Kancheepuram, Arkonam and Tindivanam and other smaller towns must be developed with supporting small-scale and agro-industrial activities. Studies have also revealed that there is great potential for the development of salt extraction, industry based on salt and the by-products of salt extraction, fisheries and tourism within the region.

I hope that the exchange of ideas and discussions at this Seminar will greatly benefit the planning and implementing of various programmes both within the Madras Metropolitan Area and the Madras-Chingleput Region. Implementation of these ambitious programmes would cost considerable amount of money. While the State Government is striving to do what is possible within its limited resources, it is obvious that unless substantial financial assistance is made available to Madras Metropolitan Development by the Centre, as in the case of Bombay and Calcutta, it is futile to expect rapid progress. Therefore, we pleaded before the Union Planning Commission that Madras City should also be equated with Bombay and Calcutta in the matter of Metropolitan development and allotment of adequate funds.

INDIA'S FASTEST METROPOLITAN GROWTH SEEN IN MADRAS AREA

—ANBAZHAGAN.

I consider that today is an important milestone in the history of Madras. Although plans were made indicating how Madras and its surrounding region must grow in the future quite sometime earlier and we have been implementing some parts of these plans, it is today that these plans are being released in order to obtain the comments of experts from outside the State as also from those who are closely connected with the implementation of various suggestions contemplated therein and the public who will ultimately benefit from them. Two plans are under consideration, one for the Madras—Chingleput Region and the other for the Metropolitan Area.

As you all know the problems of the Madras Metropolitan Area cannot be solved in isolation. They have to be dealt with in the broader perspective of the region in which it is situated. Suitable policies for population distribution, for industrial and agricultural growth and for provision of social infra-structure within the Madras-Chingleput Region are vitally essential if large scale migration to Madras is to be controlled. The first plan deals with these aspects. The second plan *viz.*, plan for the Madras Metropolitan Area examines the backlogs in the sectors of transportation, water supply and drainage, housing and other social infra-structure as on today and spells out broadly what efforts should be put in not only to clear the present inadequacies but also to meet the greater challenge of providing various facilities at reasonable standards for the future population in the next two decades and beyond.

Three-tier Policy for Metropolitan Area Development

Madras Metropolitan Area has been one of the fastest growing urban areas in the country. It has recorded a growth rate of 63% in population, the highest for the country during the last decade. In spite of the steps we may take to

reduce population by family planning programmes, development of hinterland and development of backward areas of the State, we anticipate a near doubling of population in the area from the present 3.5 million to 5.6 million by 1991. All the increase in population will locate itself in some place or other within the Metropolitan area whether we do or do not have a plan. Moreover, most of the people will naturally throng into Madras city where facilities exist for beyond the levels known to the migrants. But space within the city is already used up for various purposes and there is hardly any land left for further expansion. Naturally development will become increasingly intensified with good residential areas turning into over-congested areas, slums spreading on much needed public lands, parks and playgrounds there will be increased traffic congestion resulting in the disruption of environmental qualities of this beautiful city. Those, who cannot afford to come into the city because of economic reasons or those who cannot find even the smallest piece of land to squat, will direct their attention to the adjoining sub-urban areas such as Ambattur, Avadi, Pallavaram, Tambaram, etc., and make conditions of living there, which are already bad, deteriorate further. Unplanned developments would stifle life not only in these areas but in the city itself on which they will have to depend for work, shopping and other facilities. Hence we have thought of a three-tiered policy for the future development of the Metropolitan Area. Satellite towns at a distance of 40 to 50 kms., urban nodes on the main transportation corridors within the metropolitan area and restructuring of the central areas. After examining a number of theoretical alternatives and the actual plans formulated by various metropolises of the world including those in our country, the plan has recommended the concept of satellite towns linked to radial corridors.

This concept combines the advantages of the radial corridor type of development and the concept of

satellite of ring towns. While developments along the radial corridors will be permitted, new developments will be encouraged outside the city in the towns along the radial routes by large scale expansion of these areas. These towns will not only be designed as self-contained communities in the matter of employment, commerce and housing but also provide for the requirements of major city facilities for the communities nearer to it and along the corridors linking the new towns with the city. This would prevent congestion in the centre of city, the main drawback of the radial corridor development. Unidirectional flow along the corridors will also eliminate making the corridors function more efficiently. The development of satellite towns simultaneously with the development of self-contained urban communities along the corridors would help in an even tempo of development, conducive to proper planning. The flexibility of this concept allows it to preserve and utilise existing urban centres and tie in future ones along the regional transportation routes.

The concept of satellite towns linked to radial corridors described above would be the most suitable, easy of direction and less costly of adoption as it recognises the present trends of development. Since transportation developments can be planned and directed, future investments in railways or highways can be exploited with advantage if developments are guided along the corridors. There is also the additional assurance of decentralising industry or other economic activities into the proposed nodes and satellite towns since these go along the observed tendency of people and activities to move outwards along radial lines.

Each corridor leads to a counter magnet where important developments are expected or planned. The existing developments along the corridors will be grouped in well organised urban nodes, which are to a large degree self-sufficient with their own centre of employment,

housing and commerce and the future developments organised likewise, along the three main corridors to the west, south-west and north. A pattern of growth based on this system would provide for extremely rapid access along the main radial lines and greatly extend catchment areas within any given time distance. This would be beneficial to the industrialist seeking a large pool of available labour or conversely to the worker seeking a wide range of available jobs. This applies equally to the retailer or shopper thus giving a very high degree of freedom and choice to the individual. Provision of services like water supply and drainage would be simpler and communication costs would be limited only to the improvement of regional peripheral communication links. Countryside would be within easy reach as the green wedges penetrate the urban development.

The proposed disposition of population as in 1991 will be 3.6 million in Madras city, 1.6 million in the Urban nodes of Manali, Minjur, Ambattur, Avadi, Alandur and Tambaram and the rest distributed in the smaller urban centres and rural settlements in the Metropolitan Area. Although it has been mentioned by me that this concept of directing the future population into urban nodes along the transportation corridors has been considered to be less costly and simpler, the problems of achieving even this objective are formidable. Development of urban nodes and satellite towns requires large scale acquisition and land development, strict land and building use control, and institution of first rate infrastructural facilities—water supply, underground drainage, hospitals and schools, shopping, work places on the same standards as proposed for the city. This would involve efforts at scales not hitherto attempted. I would not here like to take up time by going into great details of the problems of the metropolis as identified in the plan but I would like to mention certain figures hereto indicate the magnitude of the problems. It would be necessary to acquire and develop 12,000 hectares of land, build 50,000 housing units annually, provide 380 mgd of water, design an extensive underground drainage system to deal with this quantity of water, provide one major hospital with 500 beds every year, provide for 30 primary schools, 20 middle schools and 4 high schools every

year. besides provision of colleges, technical institutions and other educational facilities. The enormity of the problem will be apparent if we compare past performance or present situation in some of these sectors. The State Housing Board has in the last 10 years acquired and developed about 1,500 hectares of land and both the Housing Board and the Slum Board together have achieved a peak performance of about 4,500 dwelling units per year. The present supply of water in the Madras Metropolitan Area from all sources is less than 100 mgd and only 75% of the city area is effectively served with an underground drainage system. In the sector of transportation everybody is aware of the extent of congestion on the streets and the gross overcrowding in buses and trains — a bus with a capacity of 60 seats today carries during the peak hour over 100 passengers. Not only would we need to put additional buses on the road but also redesign the road system by widening existing roads, building of new roads and replacement of level crossings with grade separators. It will be necessary not only to electrify the Madras-Trivellore and Madras -Gummidipoondi lines and run faster and frequent suburban services on them, but it will also be essential to build a mass rapid transit system on the north-south eastern corridor from Manali to Tiruvanmiyur to cope up with future movement of commuters.

The mobilisation of financial resources for such large scale attempts is more formidable. It has been estimated in the plan prepared that a limited programme would cost over Rs. 1,000 crores over a period of twenty years. This estimate would require to be revised in the light of present day costs. My estimate is that we would have to invest atleast Rs. 75 crores at current costs every year for the next twenty years—not counting the investments required to be made by the Railways—Telephones, Civil Aviation departments and the like—if we have to make a perceptible dent into the problems of the Metropolitan Area. Our total investments during the IVth Plan in the Madras Metropolitan Area have averaged about Rs. 22 crores per year only and the large gap has to be bridged.

Urban development to-day has transcended the local bodies like the Corporation and the Municipalities.

With the amount of money they can collect from the taxes assigned to them they can hardly maintain existing services at reasonable standards. Since the Metropolitan areas are pillars of national economy both the Centre and the State have to participate in a larger measure. We in our State have made efforts commensurate with our resources and will strive to do better. All this will be of no avail if we do not receive complimentary support from the Union Government. Till now we have received hardly any significant support from them in this stupendous task. This must change. I understand that the Union Government has allocated Rs. 250 crores for metropolitan development during the Vth Plan and we must be assured of our due share, if we are to plan ahead for their optimum utilisation. As I pointed out earlier we must also be prepared to raise additional resources internally. It is here that we should value the suggestions of experts who have assembled here. Taking into account our economic capabilities, we will have to evolve methods for raising resources by expanding existing taxes and introducing new ones, by recouping cost of services through service charges, by undertaking profit yielding schemes and ploughing back the profits into development. It is needless for me to stress that all these resources should go into the metropolitan development fund constituted for this purpose if these funds are to be utilised effectively for metropolitan development. We must undertake capital budgeting for the Metropolitan Area as a whole and allocate funds to various sectoral programmes according to priorities drawn up. I think this work should be taken up by the Madras Metropolitan Development Authority which has been newly brought into the picture, if the plans drawn for the Metropolitan Areas are to be effective. I am sure the experts, who will go deeply into these aspects, would come out with concrete suggestions for future guidance.

Having made these remarks, I now deem it a great pleasure to release the Madras-Chingleput Regional Plan and Madras Metropolitan Development Plan for public discussion.

* * * *

MADRAS

To-day and To-morrow

Right now, you are living in the largest city in South India, and the fourth largest in the country. Madras city had a population of 24.71 lakhs in 1971. Do you know that this is larger than the combined population of Madurai, Coimbatore, Trichy, Salem, Tirunelveli, Thanjavur, Tuticorin, Kanchipuram and Nagercoil ?

Madras To-day

With this large population within a small area problems are bound to be there. There are not enough houses, costs or rentals are high. Crowded buses, jam packed trains, not enough water, unsewered areas go to make your life miserable ; you are afraid for the safety of your children, who have to go a long way to attend schools, and may be not a good school at that !

You might have spent the best part of your life in waiting for a bus or travelling in the overcrowded bus. Many might have been the days when you were late for your work just because of the bus !

And if you manage to reach your home from your work in one piece, you are not even able to have a breath of fresh air by taking a stroll ; there are not enough parks, or open spaces, where your children may play.

The problems are going to get aggravated by the influx of more and more people coming to the city in search of elusive jobs. And this also results in the creation of slums. Already, a third of the population is living in the slums and you should see the conditions in some of these to believe it !

You must have been wondering what is being done by the Government about this situation.

A Master Plan

A Master Plan has been prepared, according to which the entire development in the metropolitan area will be guided till 1991 properly. In fact, the plan covers the entire Madras Metropolitan Area, a larger area than the city including the adjoining areas dependent upon the city. The population of the Madras Metropolitan Area is about 34 lakhs and is estimated to reach an astounding 58 lakhs by 1991 !

The Madras Metropolitan Plan 1971—1991 clearly identifies these problems, sets the targets for 1991 and outlines an implementation of the programmes in the various developmental activities so necessary for a happy life such as housing, education, medical, recreational facilities, etc.

Madras To-morrow

What are going to be the results of this plan ? Here are some pointers.

To relieve congestion within the city and also to accommodate the increase in the population, the three new towns outside the metropolitan area with a population of 1 lakh and 6 towns within it with a population of 2 to 3 lakhs will be built. Ambattur, Avadi etc. would be full-fledged towns with all facilities.

About 3.30 lakhs of houses are going to be constructed by the end of 1991. Of this, two lakhs of tenements will be for slum dwellers and economically weaker sections and the rest for the low income and middle income group.

Every house will have protected water supply. No more fighting and brawls at the sunken taps at street corners !

The city and the countryside is going to be dotted with local parks, urban parks etc., an open space system which will allow your children to play and for you to stroll and play in leisure.

The most significant improvement will be in the traffic system. The crowded buses, and sub-urban trains sapping your energy and the delays will be a bygone memory. The traffic system is going to be vastly improved, with the introduction of a rapid transit rail system between Ennore and Tiruvanmiyur. It will whizz you off from Ennore to Tiruvanmiyur in 45 minutes flat ! There are going to be wider and safer roads. No more hazardous crossings of traffic. Ring roads are going to be formed which will take you from north to south without you having to pass through congested areas.

Even the irritating congestion in the George Town is going to be a thing of past — an urban renewal project which will transform the face of George Town. Well planned shopping arcades, markets, public halls etc., are going to spring up in this area with adequately designed residential areas.

These and many other developments costing crores of rupees are in the making. Who will implement all this ? Our far-sighted Government has already created numerous implementing agencies—Housing Board, Slum Board, Water and Drainage Board, Pallavan Transport Corporation and Madras City Corporation who are already doing significant development work. Their hands will be strengthened and the missing link of an integrated plan within which they will work will be provided by the newly constituted Madras Metropolitan Development Authority. This Authority will also implement other major programmes for which specialised agencies do not exist.

SLUMS IN INTEGRATED METROPOLITAN DEVELOPMENT

Any development plan for Madras must take cognisance of the problem of slums. The very size of the problem itself is staggering and its solution becomes more and more urgent with the passing of every day. It is not realised readily that in a City of 24,70,000 persons nearly 7,37,531 persons live in slums (i.e.) nearly one third of the population of the City lives in slums ; that the average income of a family is only Rs. 164/- p.m. which in these days of high prices is not sufficient even for one square meal per day. Their capacity to pay rent is minimal as against their need for suitable accommodation with minimum amenities.

The Tamil Nadu Slum Clearance Board was set up in 1970 with a programme to clear all the slums in 7 years based on the then available data on the number of slums and population. Subsequent to the setting up of the Slum Clearance Board, a Socio Economic Survey of all the slums in the City was carried out and it was established that there are 1,202 slums consisting of 1,63,804 families and the provisions of minimum housing accommodation to all of them, if there was no further increase in population, would cost at least Rs. 175 crores or Rs. 1,750 million. The grant now made available to the Slum Clearance Board is hardly Rs. 3.50 crores annually. It is therefore necessary that if the problem is to be tackled in a short period, a significant increase in the budget allotment is absolutely necessary. Further the methods of construction will also require complete modernisation. At present the buildings are constructed on traditional lines and it takes more than a year to complete the building. Serious thought will have to be bestowed to consider methods of atleast partial prefabrication and assembling so that construction time could be reduced to 1/3 or 1/4th of the time now taken.

It has also to be borne in mind that the slum population consists mostly of workers engaged in various petty jobs like cart pullers, riksha pullers, masons, carpenters, domes-

tic servants etc., etc. and that they form a very essential segment of society supplying a very vital need. It will not be a feasible proposition to think of shifting the slum dwellers to the outskirts of the city and thus uproot them from their places of work. Housing accommodation will therefore have to be provided to them in such a way that there is least dislocation in their daily mode of living.

Slum Accommodation at Slum Site

In this connection it may not be out of place to recall a criticism voiced against the construction of tenements at Nochikuppam, Mullikuppam etc. for the fishermen. It was being suggested that it would have been better to shift them elsewhere and use the valuable land for Middle Income Group or Higher Income Group housing or even for more profitable purposes. A good suggestion indeed, but quite impracticable. Would it have been possible to uproot and shift 2,000 and odd fishermen families from the shoreline and put them far inland ? Would it have been possible to shift them along the shoreline itself further south and if so to which place ? The nearest place south would have to be far outside the City limits and this would have rendered the families jobless overnight with no possibility of selling the catch. **The Tamil Nadu Slum Clearance Board has therefore adopted the policy of providing accommodation to the slum dwellers on the same site where the slum exists.** This very well favours with the policy that segregation of work-centres from residential areas are not conducive to healthy urban life.

The congestion of slum dwellers and pavement dwellers is the greatest in the George Town area and near the Harbour area. The workers working in the Harbour, in the Kotwal Chavadi wholesale market and in the godowns and commercial establishments are the main offenders in this respect. It has been examined whether it is possible to provide any suitable accommodation for these people and it is seen that only about a quarter to one third alone could be provided for nearby

if the suggestions noted below are accepted :

The Tamil Nadu Slum Clearance Board has also examined in this connection several suggestions to provide accommodation to the slum dwellers and a few of these are presented below for consideration :—

1. The idea of shifting the Kotwal Chavadi has been discussed for several years but no firm action appears to have been taken so far. With each passing day the urgency is only becoming more imperative and also more costly. It is suggested that the Kotwal Chavadi should be shifted to the western outskirts of the city like Arumbakkam. This will not only release a vast area of at least 100 acres for better purposes but also shift the lorry congestion and concentration of working population to a thinly populated area to bring about a more balanced and equitable distribution of population.

The proposal to shift the Kothaval Chavadi wholesale godowns and the lorry, trucks parking from George Town or North Madras is not such an easy one to be implemented. It is bound to meet with very rough weather. It should be not merely a ready scheme on the outside of the city but also it has got to be a package deal with not only space and funds for putting up market, godowns and development but also has to have residential accommodation both by way of sites and services, low cost housing and necessary amenities such as dispensaries, primary and high schools, maternity centres, and recreation centres so that not only the haves but also the havenots can move convincingly to the new centre of activity. This involves deep planning, comprehensive lay out, detailed estimate and the consequent necessary funds with executive agencies to make this scheme a reality.

By
K. S. Lokavinayagam
Chief Engineer,
T.N.S.C.B.

2. The Public Works Department Workshops and the Government Press occupy vast areas of land in a very vulnerable area of the City. There is no special reasons for these institutions to be situated in the centre of a highly congested area and these could advantageously be shifted elsewhere to enable releasing the land for construction of slum tenements for pavement dwellers and Harbour workers.

3. The Central Medical Store opposite to the School of Arts occupies more than 50 acres. There is no reason why this institute should not also be shifted to the Velacheri outskirts and release the land for the construction of tenements for the weaker sections of the society. If the suggestions given in these paragraphs are put into effect it will be possible to eliminate most of the unhealth and ugly slums which now pack mark the face of North Madras.

Pursuing this line of thought further it also seems necessary that a decision is taken not to issue licences for the setting up of any major industries within the City limits. Every encouragement should also be provided for the shifting of established industries out of City limits by way of provision of land and finance at subsidised rates.

A Neighbourhood Scheme for Slum Dwellers

By these measures it will be possible not only to draw off the labour families who now disfigure the City through slum habitat but it will also be possible to a certain extent to stop the migration of rural population into the City in search of employment.

The Slum Clearance Board has also been planning taking up a neighbourhood scheme in the Velacheri area where it is proposed to provide sites and services for about 5,000 families. It is hoped that by provision of these sites and services a good number of slums could be cleared as there is a keen demand for such sites.

In this connection it will not be out of place to mention that recently the World Bank has shown keen interest in major schemes relating to sites and services programme for the economically weaker section of the society and for the slum dwellers. Such a programme has to be drawn out as an integrated project perhaps involving urban renewal programmes.

ONLY STATE TO SPEND FROM BUDGET

FOR E. S. I.

The Honourable Minister for Health Thiru K. Anbhazhagan, who participated in the opening of the newly constructed Employees' State Insurance Dispensary at Saidapet said that the State Government proposed to have another Employees' State Insurance Hospital in the City at Kalaignar Karunanidhi Nagar with a bed strength of about 200 to meet the needs of the industrial workers in South and West Madras.

He also said that the State had requested the Centre to increase the ratio of beds from four to seven for every 1,000 workers registered under the Employees' State Insurance Scheme. If this was acceded to by the Centre, it would facilitate the opening of the other hospital in the City.

He added that the existing monthly income limit of Rs. 500/- for Employees' State Insurance benefit had been recommended to be increased and if this was accepted by the Centre, about one lakh more workers would come under the scheme taking the total to five lakhs.

The Minister said two new Employees' State Insurance dispensaries at Egmore and Anna Salai would be declared open shortly.

The Honourable Chief Minister of Tamil Nadu Thiru M. Karunanidhi who declared open the Saidapet building pointed out that Tamil Nadu was the only State which had spent a sizable sum from its exchequer to supplement the financial allotment by the Centre under the Employees' State Insurance Scheme. About Rs. 1.11 crores was spent by the State Government during 1972-73.

The Chief Minister appealed to workers to go in for Employees' State Insurance benefits on bonafide grounds and not coerce doctors to give false certificates.

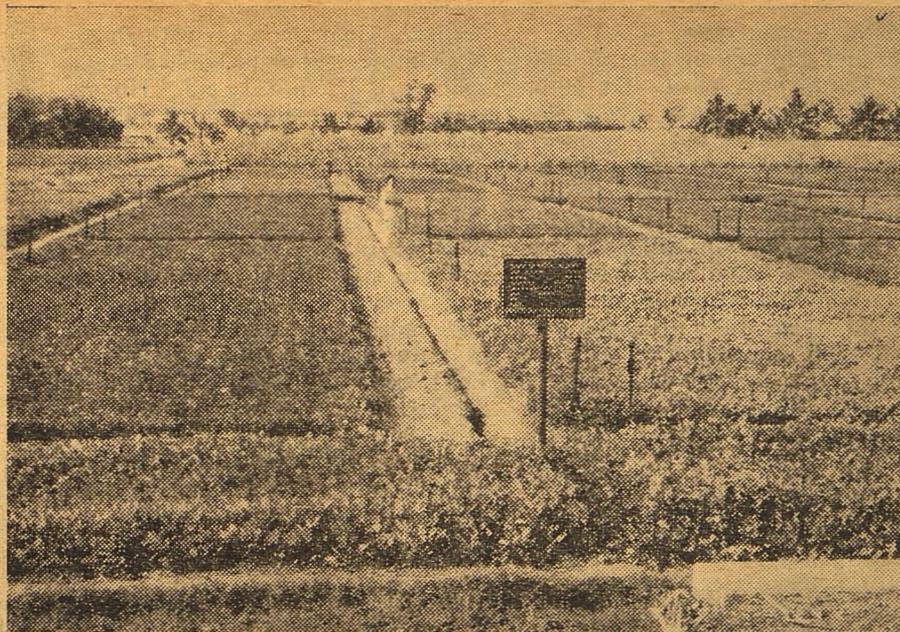
CONTRIBUTION PAYABLE TO WAKF BOARD

APPEAL BY THE MINISTER FOR REVENUE.

The Hon'ble Minister for Revenue recently visited the Office of the Tamil Nadu Wakf Board, Madras and examined in detail the particulars relating to the collection of annual contribution payable to the State Wakf Board by the Muthawallis. Huge arrears of contribution amounting to Rs. 15.81 lakhs and current demand of Rs. 2.91 lakhs are outstanding payment by the Muthawallis. In 56 cases, the Muthawallis have to pay more than Rs. 5,000/- each. Demands for payment of contribution are raised in the Wakf Board Office for which the Muthawallis are to submit their annual accounts before 1st of May of each succeeding financial year as per section 32 (2) of the Wakf Act. Muthawallis who fail to send the accounts, are liable to be prosecuted and fined upto Rs. 1,000 under section 41 of the Wakf Act. Muthawallis who fail to pay contribution without reasonable excuse for three consecutive years shall be removed from their office under section 43 (e) of the said Act. Payment of contribution by the Muthawallis to the Wakf Board is a first charge and is recoverable under the Revenue Recovery Act on a certificate issued by the Wakf Board as per section 46 (4) of the said Act. Every sum certified as due by an auditor is also similarly recoverable under the R.R. Act as stipulated in Section 35 (2) of the said Act. If a Muthawalli realises the income of the Wakf and does not pay such contribution, he shall be personally liable for such contribution which may be realised from his person or property in the manner aforesaid (section 46 (5) of the Act).

It is hoped that Muthawallis would come forward to pay the arrears of contribution quickly otherwise the Wakf Board may be constrained to resort to coercive processes for the realisation of this long pending arrears in the manner already explained, as per the provisions of the Act.

Best Crop VARIETIES FOR RABI SEASONS



In the current situation of food deficient the country and state is facing, it is our responsibility to step up food production immediately on an emergency basis. Fortunately, Tamilnadu in having facilities of well irrigation and cropping in an intensive way is possible in the ensuing summer season. For this the suitable crop varieties and gtheir package of practices are summarised herein for the benefit of the farming community.

1. Paddy:

- Better varieties—Vaigai, Kannagi, and IET. 2222 and IET. 2508.
- Season—January-February to April—May.
- Package of practices—Raise healthy nursery.
Transplant 21—24 day old seedlings—Follow a manurial schedule of 50 : 25 : 25 kg. of NPK respectively per/ha.

Apply 50% of the total dose of nitrogen and full dose of P and K at planting and the 50% balance of nitrogen dose 20 days after planting. Irrigation at flowering is critical and hence make sure of good water supply during this period. Stem borer menace will be there and it can be controlled by applying parathion at 0.025% (1 ml. in 2 litres of water) on 15th, 35th and 45th day. Good control of weeds can be had by pre-emergence application of Machete granules (1.5 kg. a.i/ha) or post-emergence application of stam F. 34 (3.0 lit a. i./ha). Ensure a plant population of 55-60 hills per square meter to obtain higher yields.

When all the package of practices are followed an yield of 5 tons per/ha can easily be obtained.

2. Cholam:

- Better varieties :
 - Hybrids—CSH5, Co. H. 2.
 - Variety—C. S. 3541.
- Season—First fortnight of February.
- Seed rate—Hybrids—10 kg/ha
Variety—15 kg/ha
- Age—100—110 days.
- Package of prtices—Prepare the field well by giving 1—2 ploughings followed by one harrowing with tiller.

Apply 10 tons of farm yard manure or compost/ha. In summer the stemfly menace will be high. This could be effectively controlled by treating the seed with one gram of effectively controlled by treating the seed with one gram of carbofuran per kg of seed. Follow a spacing of 45 cm X 15 and thin the crop leaving one healthy seedling per hill. Apply fertilizers basally to supply 50 kg. N, 60 kg P₂O₅ and 40 kg K₂O/ha. On 30th day of sowing top dress the crop with nitrogen at 50 kg/ha. Have effective weed control with timely hoeing and weeding or application of atrazine or simazine. Give irrigation once in 7 to 10 days depending on the soil chreteristics. Control the initial stem fly attack by sprging Endrin 1 litre or Sevin 2 kg. in 450—500 litres of water per/ha. Stem borer ca be

controlled by application of Endosulphon 4% (8 kg/ha), or lindane 2% (12 kg/ha) or Carbaryl 4% (15 kg/ha). Control the Midge attack by spraying Endosulphon (35%) at one litre in 500 litres of water/ha. By following the package of practices, it is sure to obtain an yield of 5 tons cholam grain/ha.

3. Cotton :

- Better varieties :

MCU 4	160—165 days
MCU 8	
PRS 72	130 days
MCU 7	130—140 days.
- Season February 1st fortnight
- Package of practice :

Follow a seed rate of 25 kg/ha. Treat the seed with organo mercurials at 2 gms. per kg. of seed. Dibble 3—4 seeds/hill giving a spacing of 60 cm between rows and 22.5 cm. between plants with-in the rows. Apply 30 kg/ha each of N P and K as basal dressing. On 35th to 45th day of sowing top dress with nitrogen at 30 kg/ha. Weed control is a must and hence commence hoeing and weeding at the earliest possible convenience or herbicides like lasso or cotoron can be used. Irrigate the field once in 18—20 days after giving life irrigation on 4th day of sowing. Plant protection should be given the top most priority and the farmer should be vigilant to save the crop with timely prophylactic and control measures. On 14th day and 30th day metasystox endrin (1 ml. in 1 litre) to be applied.

On 45th day parathion (1 ml. in 1 litre) and copper fungicide at 1.25 kg/ha has to be applied. On 60th, 75th, 90, 105, 120 and 135th day Sevin 50/ (1.25 kg/ha) Copper fungicide at 1.25 kg/ha have to be applied. At 150th day BHC DDT each 12.5 kg/ha has to be dusted. Pick the kapas in time, dry and store cleanly. Sort out the kapas for quality and market them separately. An yield 20 quintals of kapas per hectare will be obtained.

4. Groundnut :

- a. Better varieties—TMV 7, POL. 1, POL. 2
- b. Duration—105 days.
- c. Season—January, February to April, May.
- d. Package of practice:

Give 2—3 shallow ploughing and prepare the field well. Apply 12.5 tons of farm yard manure or compost per hectare. Form beds and channels and make provision for good drainage. Apply fertilizers before last ploughing to supply 18, 36 and 54 kg. of NPK/ha respectively. In sandy soils and lateritic loams it is better to apply 250 kg. of gypsum (CaSO₄) basally per/ha. Follow a seed rate of 125 kg. kernels



per/ha. Treat the seeds with rhizobial culture. Sow the seeds giving a spacing of 22 cm X 15 cm. Hoeing and weeding should be done on 20th and 40th day of sowing. Irrigation can be given once in 10 days. It is important to provide irrigation at the time of peg formation. Save the crop from pest and diseases by spraying (i) on 20th day apply BHC . . DDT each 12.5 kg/he (ii) On 30th day endrin or parathion at 1 ml. in 1 litre (iii) On 40th day BHC . . DDT each 12.5 kg/ha (iv) On 50th day endrin or Parathion at 1 ml. in 1 litre (v) On 75th day rogor or metasystox at 1 ml. in 1 litre. With this an yield of 3750 to 5000 kg. of pods can be obtained per/ha.

5. Sunflower :

- a. Better varieties :
 1. EC 68413 (Vinimack) Suited to Coimbatore, Salem, Dharmapuri and Trichy
 2. EC. 68414 (Peradavic) Suited to Madurai, Ramanadhapuram and Tirunelveli. (Dist.)
 3. EC. 68415 (Armavirsk) Suited to Chingleput, South Arcot, North Arcot and Thanjavur District.
- b. Season—January—February to April—May
- c. Duration—80—85 days.
- d. Package of practices :

Prepare the field well, apply 20 tons compost/ha and form beds and channels. Treat the seeds with Brasicol at 2 gram/kg. of seed and dible the seeds in beds giving a spacing of 45 cm. X 22.5 cm. Apply basally 40, 60 and 40 kgs. of NPK respectively per hectare. Give irrigations once in 12—15 cdays after giving life irrigation on the fourth day of sowing. This crop is not much affected by pests and diseases. In hectare an yield of 2000—2500 kg. of sunflower seed (kernel) could be obtained.

6. Pulses crops :

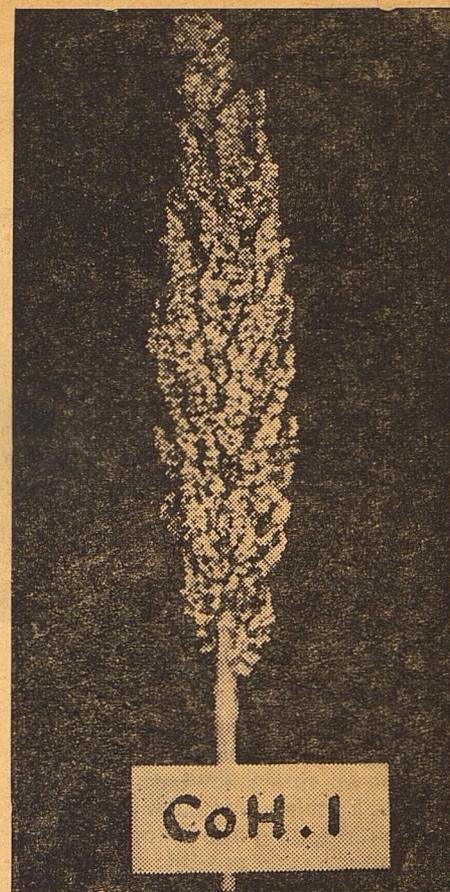
- i. *Green gram*

Variety	..	Co. 2
Duration	..	65—70 days
- ii. *Blackgram* :

Variety	..	Co. 2
Duration	..	60—65 days
- iii. *Cowpea* :

Variety	..	Co. 2
Duration	..	90 days
- iv. *Lab-lab* : (Mochai X Avarai varieties)

Variety	..	Co. 6, Co. 7 and Co. 8.
Duration	..	120 days.



Package of practices:

All the above four pulses can be sown in February—March Prepare the field well and incorporate 12.5 tons of farm yard manure/ha. Apply nitrogen and phosphorus at 25 kg. and 50 kg/ha respectively as basal. Treat the seeds with rhizobial cultures before the sowings. The spacing can be as close as 25 cm X 5 cm. for green and black gram. For cowpea and lab-lab give a spacing of 30 X 15 cm. Forming ridges at 60 cm distance and sowing on either sides of the ridge will be better than sowing in beds and channels. Irrigation has to be limited at early vegetative phase. Provide good irrigation at flowering stage. At this stages plant protection is vital. Save the crop from pod borers. At initial vegetative phase, the crops could be easily saved from pests and diseases by spraying systemic pesticides as metasystox or Rogor mixed with some of the copper fungicides as Fytolan or Cupravit. Timely weeding, clean and thorough cultivation will enhance the yield of pulses.

By raising pulses, the yield of succeeding crops can also be expected to be better besides earning savings in the fertilizer bill.

Latest Research Findings To Increase The Yield of Rabi Crops

Modern agricultural technology is perforce to be provided to the farmers by the Agricultural Universities in co-operation with the State agencies. In fulfilment of this objective, Universities are helping the rabi production programme in the (a) production of nucleus, foundation and certified seeds, (b) pest survey and surveillance programme and the organisation of plant protection campaigns, (c) scientific soil and water management in irrigated areas, (d) preparation of contingency crop production plans to suit different weather conditions and (e) inter-cropping commercial crops like sugarcane and cotton with pulses, oilseeds and vegetables, etc.

Monetary inputs like fertilizers, pesticides, fungicides, seeds apart, the rate of non-monetary inputs in increasing crop yield cannot be minimised. The yield of rabi crops can thus be increased by carrying out sowing or planting in correct time, optimum population for field crops, maintenance of plant geometry of crops, effective weed control practices, efficient irrigation and drainage practices, and harvesting at correct time and post harvest technology all of which do not cost any fresh investment. It is all the more important that during the present water and fertilizer crisis, non-monetary inputs not only save money but also increase crop yield considerably. Still higher yield can of course be obtained by higher application of fertilizers, but our stress is that considerable saving in fertilizer can be obtained when their application is based on season, split dose, soil test value, legume in multiple cropping, proper placement, correct water management, weed control, use of slow release fertilizers, recycling the nutrients, adequate micro nutrients and bacterial fertilization etc.

All these non-monetary inputs and the economic use of fertilizers should be considered in increasing the yield of rabi crops and the results of experiments conducted at Tamil Nadu Agricultural University, Coimbatore and its centres are given below crop-wise.

Rice

Among the new rice varieties, Vaigai and CR 44-35 have been

found suitable for Coimbatore region. At Bhavanisagar, Kannaki in rabi season recorded an yield of 6 tons per hectare. January—February sown crop of IR. 8 yields the highest (5,646 kg/ha) in Coimbatore. A spacing of 10 X 10 cm with a density of 100 hills per sq. m. gave minimum yield in Kannagi. Nitrogen application of 50, 25 and 25 per cent of the total in three split doses at basal, tillering and panicle initiation respectively or 30, 30, 20 and 20 in four splits with the last 20 at flowering is the optimum time of application for rice. Saturation in the tillering stage and submergence in other times saves 20 per cent of water as compared to continuous submergence. A seed rate of 60 kg/ha appeared to be optimum for direct seeding of varieties Jaya and IR. 20 under wet condition. In low fertility condition, use of Azotobacter will be helpful in fixing the atmospheric nitrogen and thus save on fertilizer use.

The hybrids CSH. 1 and CSH. 2 have performed better than 302, 604, and Co. 20. At 50 percent available moisture in soil, application of 100 kg N has given higher yield in hybrid sorghum. At Bhavanisagar the cereal—legume ratio of 2 : 1 was found to be the best and among legume components lab-lab was

found better. The economical dosage of N for both Co. 9 and Co. 10 ragi at Coimbatore has been 45 kg/ha. while the optimum spacing has been fixed at 15 cm X 15 cm. At Bhavanisagar ragi Co. 10 performed better in rabi season yielding 4,222 kg/ha. There has been good response to graded dose of N application upto 130 kg/ha. Water requirement for Deccan hybrid maize was 580 mm in 11 irrigations.

Pulses

While there is no response for nitrogen, there is slight response to P at 20—40 kg/ha with green gram, lab-lab and cowpea. Lab-lab at 60 X 10 cm spacing has given higher yield of green pods. Timely cultural practices and plant protection are found important in stabilising pulse yield. Pulses are sensitive to water stagnation and salt content in water.

Oilseeds

At Bhavanisagar the groundnut varieties Ah. 7911 has given the highest yield (4,417 kg/ha.) with 18 : 34 : 52 kg NPK and 22.5 X 10 cm spacing. Fertilizer P has no influence on yield. Irrigation at 25 per cent available moisture is sufficient for good yield in rabi season at Coimbatore. In Sunflower, the variety E.C. 68413 is most promising for Coimbatore, Salem, Dharmapuri and Trichy districts while E.C.



View of unweeded plot. In neighbouring plots weeds are controlled by herbicides.

68415 suitable for Arcot, Chingleput and Thanjavur districts, while E.C. 68414 for Southern districts. January sowing is considered the best for irrigated crops. A row spacing of 45 cm has been found optimum at Coimbatore. Irrigation at 60 per cent available soil moisture seems to be good. In gingly TMV. 3 is suitable for rabi season.

Sugarcane

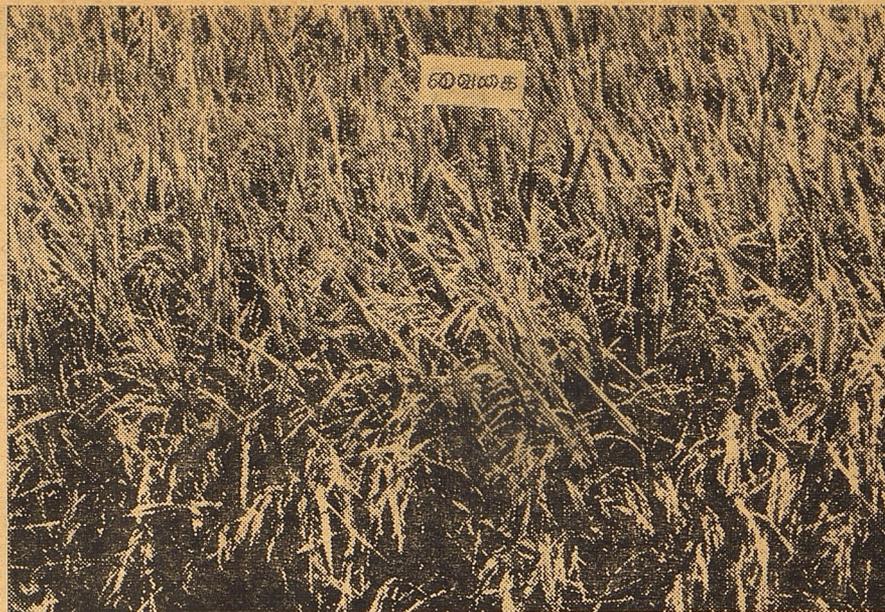
Higher level of N depressed juice quality but the quality improved in the combined application of N, P and K at both the levels of Nitrogen. Frequent irrigation to sugarcane reduced the sugar recovery by 1.8 units as against irrigation at wilting point. However, the cane yield was maximum with 100 tonnes/ha. in plots receiving frequent irrigation. Delayed application of nitrogen reduced both sugar recovery and cane yield. Application of extra doses of phosphorus and potash at 180 days along with late nitrogen manuring recorded high sugar recovery. Application of cane ripeners improved the juice quality.

Fibres

The economic N dose has been found to be 60 kg/ha. in Coimbatore. Application of 45 kg. N to soil and 7.5 kg. N as foliar spray gave higher yield than the application exclusively through soil. Placement of fertilizers 5 cm. deep has been good. Cycocel spray at 40 ppm given at square formation stage has increased the kapas yield in Coimbatore and Srivilliputhur. Soil application of succinic acid at 1 kg/ha. had recorded the highest yield at Srivilliputhur. In the mixed cropping of green gram, blackgram, onion and bhendi with cotton, bhendi gave higher monetary return than others. Mesta HC. 269 with an yield of 27 tonnes fibre/ha. is worthy of wider recommendation.

Cropping Systems

Under garden land conditions of Coimbatore, the series ragi (Co. 9) -cotton (MCU. 5)-Cholam (CSH. 1) is a suitable cropping sequence with net return of over Rs. 10,000/- ha./year. In Aliyar, Cholam—horse gram sequence in garden land, and rice—blackgram in wet land have given higher net returns. If water could be supplemented during early part of summer, groundnut—cotton (MCU. 5) gives a more profitable cropping sequence. Sunflower and groundnut suit well for cropping rice fallows in Madurai region.



Best crop varieties for rabi season

Salt Tolerance of Crops

Among the cereals, rice and maize were greatly affected; wheat and cumbu moderately affected, while ragi, varagu, panivaragu, tenai and samai and safflower were tolerant to saline conditions. In cotton, the variety Sujatha was more tolerant than MCU. 5 and in other crops red gram, green gram, black gram, cowpea and sunflower were moderately tolerant to salinity.

Weed Control

Maintenance of weed-free plots by carrying out chemical weed control practices at the correct time particularly by pre-emergence sprays have increased the yield to a great extent as compared to the normal weed control practices mechanically. Pre-emergence sprays help in making more nutrients and moisture available to the crops for increased yield.

Different pre-emergence sprays have been recommended for the crops grown as below:

By adopting the above agronomic findings, rabi crops yield can be increased considerably. Inter-cropping with commercial crops like cotton, groundnut, sugarcane is favoured in the rabi season. This will provide not only additional yield but also employment to the farmers throughout the season. The use of non-monetary input will be more helpful in increasing the yield. Increased irrigation and water use efficiency is important particularly in rabi season when evaporation demand is more. Sowing or planting in levelled field and scheduling irrigation at least in critical periods like tillering, flowering etc. will not only economise water but also increase the yield considerably.

Pre-Emergence Herbicides Recommended

Crops	Name of the herbicide	Dose
Paddy :		
(i) Direct sown	Machete (G)	2 kg. a.i./ha.
(ii) Transplanted	Do.	Do.
Sorghum	Atrazine	0.5 kg. a.i./ha.
Ragi	Tok—F—25	0.75 lit. a.i./ha.
Cumbu	Atrazine	0.4 a.i./ha.
Maize	Simazine	0.5 a.i./ha.
Cotton MCU. 5	Cotoron or Tok-F.25 or Lasso	1.25 kg. a.i./ha.
	Lasso	2.0 lit. a.i./ha.
Groundnut	Lasso	1.5 lit. a.i./ha.
Sunflower	Prometryne	1.5 lit. a.i./ha.
Cowpea	Prometryne	1.00 kg. a.i./ha.
Mixed crop	Prometryne	0.75 kg. a.i./ha.
Cholam —Lab-lab	Lasso	1.5 lit. a.i./ha.

In Tamil Nadu 100 lakhs acres out of 160 lakhs acres of cultivated area are classified as dry lands, accounting for 48 per cent of the total foodgrains output. If the Production from this area is improved even marginally, it will make for a sizeable increase in the total output.

One of the way to increase the production of dry land is the use of drought resistant varieties. It is the cheapest method of increasing dry land production and as such deserves prime attention. Because of the monsoons' vagaries, dry land require short duration varieties than wet lands. Therefore, the Government of Tamil Nadu is always bestowing its attention in the evolution of drought resistant short duration varieties.

Some good results have already been achieved. It has been established that a few drought resistant short duration varieties like 'Co. 31' paddy, 'C.S.H. 2' Cholam, 'H.B. 3' Cumbu and 'MCU. 6' Cotton do better than local varieties under conditions of sub-normal rainfall.

The details of experiments conducted by the Department of Agriculture and the Tamil Nadu Agricultural University to evolve drought resistant short duration varieties suitable for rainfed cultivation, drought resistant short duration varieties evolved so far and their yield potential are given below.

Drought Resistant Strains

Paddy : A scheme for the evolution of drought resistant varieties in paddy functioned for ten years from 1954 to 1961 as a result of which a medium duration paddy strain, namely, 'Co. 31' was released for general cultivation in the year 1963—64.

During the first four years of the Fourth Plan period 'TKM. 7' (Kullakkar) a short duration, drought resistant paddy strain was released for cultivation during 1973. An elite Culture 1251 (TKM.6×T (N) 1) has been identified. 'TKM. 7' matures in 108 days and it is suitable for Sornavari, Samba and Navarai seasons.

The culture 1251 is now tested in adaptive research trials in the southern and northern parts of the State. From the available data from Thirunelveli District it is

TAMIL NADU EVOLVES STRATEGY FOR STEPPING UP DRY LAND CROPS



known that the culture 1251 has recorded an average grain yield of 4,684 Kg./ha. in 108 days under direct seeding.

A very short duration culture 7711 of parentage (IR. 262 × ADT 27) has been evolved at the Regional Agricultural Research Station, Aduthurai. It has a duration of 85 to 90 days. This culture is being tested in Ramanathapuram, Madurai, Tirunelveli, Kanyakumari, Chingleput and North Arcot districts. The available data indicated its good performance. Its grain yield has gone even above six tons per hectare whereas the average yield is 3.9 tonnes per hectare under normal environments.

The elite culture 1251 of parentage (TKM.6 × T (N) 1) is being tested at farmers' fields along with suitable standards. New Crossing Programmes are also undertaken with new and improved genotypes.

Cholam : For cultivating in tracts of southern districts, a new hybrid 'Co. H2' has been released. This is also known as 'Kovilpatti Tall Cholam.'

This new variety matures in 90 days and yields about 44 quintals of grain and 120 quintals of fodder per hectare on an average. This amounts to a superiority of about 42 per cent in grain and 19 per cent in straw over the earlier release 'K3' Cholam (which has a longer duration of 120 days).

Likewise for the 'Periamanjai Cholam' and 'Thalaivirichan Cholam' tracts a new hybrid, namely, 'Co. H.1' has been developed. This is suitable for June--July sowings and matures in 100--105 days. Its yield potential is about 63 quintals of grain and 125 quintals of fodder per hectare.

Apart from these varieties a few other early maturing varieties are also presently under evolution.

Cumbu : Short duration hybrid varieties of cumbu are under spread in Tamil Nadu during the past six or seven years. These mature in 80—90 days. Since, even native varieties of cumbu mature in 90—95 days, problem of 'early maturity' has not been very pronounced in cumbu crop.

In severe drought also the hybrid variety 'HB. 3' Cumbu yields upto 15 quintals of grain per hectare in a very short duration of 75 days. Research has been undertaken to develop hybrids even superior to 'HB. 3' with better yield potential and resistance to fungal diseases.

Ragi : A few years ago, long duration (120 days) varieties, such as 'Co. 1' and 'K2' varieties were being recommended for the rainfed tracts in the Districts of Salem, Dharmapuri and North Arcot.

Recently, varieties like 'Co. 10', 'Saradha' and 'PR. 202' are being recommended. Among these, 'Co. 10' comes to maturity in 90--95 days, while the other two mature in 100—105 days. These varieties are capable of yielding about 20 quintals of grain per hectare on an average.

Varagu : Varagu is cultivated exclusively under dry land conditions, and has a growth duration of about 140 days. The presently recommended strain 'Co. 2,' is also of 140 days duration. Generally speaking,

the need for short duration improved varieties in this crop is not emphasised. However presently, efforts have been commenced to develop short duration varieties in this crop also. A few selections maturing earlier than 'Co. 2' by about a month and with better yield potential are being evolved.

Cotton : Investigations are underway to isolate very early cotton types, as an approach to escape the severe drought prevalent during the latter half of the cotton cropping season on the dry land areas. 'MCU. 6' cotton also known as 'Bharathi' is one such strain evolved at the Regional Agricultural Research Station, Kovilpatti, which possesses shorter duration by 15 days than the existing Cambodia strain 'Laxmi' and by about 30 days than the current Karunganni Strain 'K. 8'.

'MCU 6' yields 693 Kilos of cotton kapas per hectare. It yields 253 kilograms of lint per hectare. The variety 'K'8' cotton has a duration of 180 days. This yields 315 kilograms of kapas per hectare and 113 kilograms of lint per hectare.

Groundnut : Two high yielding short duration strains of groundnut, viz., 'TMV. 2' and 'TMV. 7' were evolved prior to the Fourth Plan period. 'TMV. 2' was evolved by mass selection from the Gudivatham bunch variety. This has a duration of 100—105 days and is a cosmopolitan variety suited for cropping both under rainfed and irrigated conditions. This strain possesses the problem of non-dormancy i.e., the seed germinates in the field itself at maturity immediately on receipt of rains. It is highly susceptible to the 'Tikka' leafspot disease.

To get over the defects of the strain 'TMV. 2,' work was carried out in later years and the strain 'TMV. 7' has been evolved. 'TMV. 7' is a high yielding bunch strain suited for rainfed cropping evolved by pureline selection from the variety "Tennessee White" of USA. This gives 20 per cent higher yield than 'TMV. 2' and has a dormancy period of 10 days beyond maturity. This has a duration of 105 days and is also comparatively tolerant to 'Tikka.' The average yield of this strain is 1.32 tonnes per hectare.

In the beginning of the IV Five Year Plan period 'TMV 9,' a short duration bunch strain, evolved by

hybridisation between 'Bromie—3' and 'Bassi' (African types) was released. This has the same duration as 'TMV. 7' and has dormancy period of 15 days and yields 1.38 tonnes per hectare and is highly tolerant to "Tikka" leaf spot disease. It is suited for both rainfed and irrigated cropping.

As a result of experiments conducted at the Regional Agricultural Research Station, Tindivanam under the All India Co-ordinated Oilseeds Improvement Project four varieties, viz., '14—4,' 'TG. 3,' 'EX. I.I.' and 'AH 8180' were selected as promising varieties. These varieties have been raised under district trials with 'TMV. 7' to find out which will give additional yield.

Castor : As a result of the breeding work initiated prior to the Fourth Plan, two high yielding short duration strains suited for rainfed cropping, viz., 'SA. 1' (135 days) and 'SA. 2' (110 days) were evolved and released during Fourth Five Year Plan period. 'SA. 2' is shorter in duration than 'SA. 1' by a month and is drought resistant and suitable for areas where rainfall is low.

Gingelly : As a result of experiments conducted prior to Fourth Plan period, two short duration varieties, viz., 'TMV. 2' and 'TMV. 3' strains of gingelly have been evolved which are suited for rainfed ember—December to February—March). Both have a duration of 80 days with an oil content of 52 per cent.

Sunflower : Under the scheme for the improvement of sunflower implemented at the Regional Agricultural Research Station, Kovilpatti, a number of varieties were studied. A high yielding strain viz., 'K.1' (EC. 68414—Russia) with a duration of 90 days was released. Hybridisation work has also been taken up for evolution of short duration strains of sunflower.

As a result of intensive work the following strains suited to rainfed condition with short duration have been released by the Tamil Nadu Agricultural University recently.

CEREALS

Cholam 'CO. H.2' : A tall hybrid cholam variety with 100—105 days duration resistant to

'downy mildew' suited for rainfed cropping in Coimbatore and southern districts.

771 Cholam : A medium dwarf cholam variety tolerant to pests, diseases and drought with high 'ceretone' content.

'Co.4' Tenai : A short duration Tenai variety of 65 days suitable for mixed cropping under rainfed conditions.

'Co. 2' Samai and 'Co. 10' Ragi : Short duration varieties having a duration of about 90 days.

PULSES

'Co. 1' Redgram : Suitable for pure as well as mixed cropping having a duration of 135 days.

'Co. 2' Blackgram : Non-season bound variety suitable to be grown under rainfed conditions as mixed crop.

'Co. 2' Greengram : Non-season bound variety maturing in 60 to 70 days with 80 per cent synchronous fruiting and maturity.

'Co. 1' Cowpea : Duration of 100 days. Suitable for all districts as rainfed crop.

'Co. 6,' 'Co. 7' and 'Co. 8' Lab-Lab : All the three varieties mature in 120 days and yield about 4 tonnes per hectare.

'Pol. 2' Groundnut : Duration 105 days. Yields 1,500 Kg. per hectare.

The advantage of the above varieties should be exploited fully. This has to be supplemented by mixed farming. Since success in this field will stabilise the agricultural income of the dry land farmers who account for the bulk of the State's total population, the direction in which the effort should be made is clear.

Note : Statement placed on the table of the House of Tamil Nadu Legislative Assembly on 13—12—74 by the Honourable Minister for Agriculture, Thiru Si. Pa. Aditanar for the Stared Question No. 2831.

SUGGESTIONS FOR INCREASING AGRICULTURAL PRODUCTION

South Arcot District is one of the important districts in Tamil Nadu which provides scope and hope for increased agricultural production and increased income per unit area. There are different soil types with varying irrigation facilities for continuous cultivation of different crops throughout the year.

North east monsoon starts in the month of August—September and ends in November—December and Southwest monsoon starts in June and ends in August giving about 50% and 35% of total rainfall of the area respectively. The average rainfall of the district is 1,168 mm.

Out of 26.93 lakh acres of total area, 14.64 acres come under net area cultivated. In that 6.51 lakh acres are under irrigation by way of canals, tanks and various lift irrigation means (1.93 lakh acres by canals, 2.91 lakh acres by tanks and 1.67 lakh acres by other means). Though there is no artificial irrigation resources for 8.13 lakh acres, rainfall received during South West monsoon for about two months followed by definite North East monsoon for about 3 months provides the possibility of double crop cultivation. With the tapping of underground water with lift irrigation, multiple cropping can be made possible successfully in this area also.

Cultivated Crops

Paddy is cultivated as one of the main foodcrops in about 50% of the cultivated area (7.88 lakh acres) followed by Cumbu (1.35 lakh acres), Cholan (0.92 lakh acres) and Ragi (0.63 lakh acres). Groundnut is cultivated as main oil seed crop (4.04 lakh acres) followed by gingelly (0.44 lakh acres). Sugarcane is cultivated in 0.43 lakh acres. In the paddy follows and in dry and garden lands, blackgram and cotton are cultivated in 0.70 lakh acres and 0.06 lakh acres respectively. Other crops like Banana, Chillies, Coriander, Tapioca, coconut, Betervine and Varagu are also cultivated in limited areas.

IN SOUTH ARCOT DISTRICT WITH CHANGE IN CROPPING PATTERN



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Cropping Pattern

Depending upon the irrigation resources and soil type, the cropping pattern varies in different places. However, single or double crop of paddy is invariably cultivated in the Project areas. As the lifting of underground water by pump sets is coming up speedily, successful cultivation of three crops becomes possible and is being adopted already by some farmers in these areas.

Garden land cultivation fully irrigated with pumpsets, including artesian wells, is practised in about 1,37,000 acres. The soil is mostly of sandy loam type. This is found predominantly in parts of Tindivanam, Villupuram, Gingi, Rishivandiam, Nallur and Cuddalore Taluks. Depending upon the water availability in the wells and monsoon rains, three crops with paddy, millets, oil seeds, pulses, cotton etc., are being cultivated under garden land condition while sugarcane is cultivated in some areas.

Dry Land Cultivation

Under dry land conditions, both black and red soil with mostly sandy loam structure are prevailing in parts of Kallakkurichi, Tindivanam, Thirukkoolur and Villupuram Taluks. At present millets like Cumbu, Ragi, Cholan, oil seeds like groundnut and gingelly, blackgrams and redgrams are being cultivated as main or mixed crops. Millets followed by oilseeds or grams are the common rotation.

Latest Developments in Agriculture

Latest developments in agriculture have provided many high yielding varieties in paddy, millets, oilseeds, pulses etc., which are shorter in duration compared to many prevailing varieties. As such it is possible to utilise the land to get maximum production per unit area with available water and other resources.

Three and four crop sequences that can be adopted in an year in South Arcot district is given in Table 1 and 2. Where the land is of low lying nature and where the canal water is available for some substantial period and where the supplementation of well water has been provided, two or even three crops of high yielding shorter duration varieties may be cultivated one of which being a pulse crop.

Under wet land conditions, when canal water is limited and in the garden land condition where lift irrigation is the main source of irrigation, cultivation of paddy may be limited to one or two crops preceded or succeeded by any one of the

shorter duration millets, oilseeds, pulses or vegetables. Rotation of paddy and millets with oil seeds or with a cash crop like cotton will give definite increase in farm income. Depending upon the soil, water availability and marketability of produce any one of the crop sequence suggested can be adopted.

Under dry land conditions, use of high yielding shorter duration and drought resistant crops are recommended. Improved dry farming practices and early sowing immediately after monsoon showers will give increased production. However, tapping of underground water can be intensified in these areas for

providing protective irrigation and for obtaining increased production.

Successful crop production requires, adoption of improved method of cultivation practices adequate fertilizer, application and adoption of necessary plant protection measures. However, proper selection and adoption of crop sequences is very important for better maintenance of soil, profitable utilisation of nutrients, economical use of labour, water and other resources with the consideration of marketability and price. Proper planning on the above guidelines will definitely lead to maximum income and profitable farming.

TABLE—1

FOUR CROP SEQUENCES SUGGESTED FOR SOUTH ARCOT DISTRICT

<i>June to August—September</i>	<i>August—September to November—December</i>	<i>December to February—March</i>	<i>March—April to June</i>
1. Paddy (105 days including 25 days in nursery) Rathna, Cauvery.	Paddy (125 days including 30 days in nursery) I.R. 20	Paddy (105 days including 25 days in nursery) Cauvery, Rathna, Kannagi.	Bisagimoong Pulses 60 days or HB. 3 pearl millet 80 days including 20 days in nursery.
2. Paddy, Rathna, Cauvery.	Paddy IR. 20	Gingelly (90 days)	Do.
3. Paddy, Rathna, Cauvery (Co. 34)	Paddy IR. 20	HB. 3 Cumbu/Ragi PLR. 1 (90)	Bisagimoong.
4. Sunflower—90 days	Paddy, Rathna, Cauvery, IR. 20	Groundnut (TMV. 7) (105), Gingelly (90)	Cumbu/Ragi
5. Cumbu/Ragi	Paddy Rathna/Cauvery	Paddy IR 20, Cauvery, Kannagi.	Greengram (Bisagimoong)
6. Vegetables (90 days) Field Beans	Paddy Rathna, Cauvery.	Paddy, IR. 20, Cauvery, Kannagi.	Greengram (Bisagimoong)
7. Vegetables (90 days)	Paddy Rathna, Cauvery	Groundnut T.M.V.7/ Gingelly.	HB.3 Cumbu/Ragi

Four crops in an year can be programmed having a separate area for nursery and where lift irrigation is possible all over the year and where the canal irrigation is supported with lift irrigation. This is possible in most parts of the Cuddalore and Villupuram divisions and in some pockets of Kallakurichi division. Four crops in an year cannot be possible in Tindivanam division. However, three crops can be grown successfully in most parts of the South Arcot district.

TABLE—2

THREE CROP SEQUENCES SUGGESTED FOR SOUTH ARCOT DISTRICT

<i>May—June</i>	<i>August—September</i>	<i>August—September to December—January</i>	<i>December—January to March—April</i>
1. Paddy	Rathna, Cauvery	Paddy (I.R. 20, Ponni)	Paddy (Cauvery, Thiruveni, Kannagi, Rathna.)
2. Paddy	Do.	Paddy Do.	Cotton/Groundnut TM.V 7/ Gingelly/Cotton-Groundnut mixture
3. Paddy	Do.	Paddy Do.	Cumbu/Ragi/Blackgram.
4. Paddy	Do.	Paddy Do.	Chillies/Vegetables.
<i>April—May to July—August</i>	<i>July—August to October—November</i>	<i>November—December to February—March</i>	
5. Cumbu/Ragi/Maize	Paddy (Rathna, Cauvery)	Paddy IR. 20	
6. Blackgram, Lab Lab	Paddy Do.	Paddy/Cumbu/Ragi, Groundnut.	
7. Sunflower	Paddy Do.	Cotton/Chillies/Groundnut (TMV. 7 or TMV. 10)	
8. Groundnut TMV. 10	Paddy Do.	Do.	
9. Vegetables	Paddy Do.	Do.	
10. Cumbu/Ragi/Sunflower	Vegetables	Do.	

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LAND CONTROLS AND LAND POLICIES FOR METROPOLITAN DEVELOPMENT

A back-ground paper prepared by

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All economic and social activity ultimately takes place on land and hence it is possible to channelise economic and social activity in desirable ways by exercising control on the use of land. Many of the ills facing urban areas such as extreme traffic congestion in certain areas, pollution of air and water, can be directly related to improper land use, a direct result of lack of land use control. This has been realised by planners, administrators and politicians for a long time, yet it is surprising that very few urban areas have instituted any form of control of land use. The institution of land use control even in metropolitan cities is of recent origin. Delhi and Bombay, to a certain extent are perhaps the only two cities which have a fairly sophisticated system of land uses. In spite of a large tradition of planning, Madras does not have a system of land use control which can prevent misuse of land. If this situation continues, pressure on the city's land will increase with the increase in population, resulting in the intensification of traffic congestion, building up of open spaces and proliferation of slums.

Land use structure :

The studies made in the Madras Metropolitan Area so far reveal the disparities in the land use structure as between the City and the rest of the Madras Metropolitan Area (Tables 1 & 2). Significant points to note are the low percentages in residential and commercial use in the area outside the city coupled with a high % under industrial use. The city continues to accommodate most of the residential population who commute to the workplaces outside and such population that resides in the outskirts heavily depends upon the city for major commercial and other city facilities.

The other significant facts about the general pattern of the existing land use are — (i) Urban sprawl in the absence of a comprehensive development plan ; (ii) ribbon development mostly of industrial and commercial nature, along the highways and main roads ; (iii) location of most of the major industries without relation to the urban structure ; (iv) mixed land uses.

Land Development :

The studies also reveal that residential uses have been the major land consumers followed by industrial uses. The State Housing Board and its predecessor CIT, have been the major public agencies in the development of land for housing and the Department of Industries, the major agency for the development of land for industries. Land Development in private sector is by a few speculators, and real estate agents.

While land development by public agencies has by and large conformed to the draft plans for the city as a whole or followed the general guidelines laid by the Planning Department both in terms of location and provision of amenities and facilities, those carried out by speculators and real estate agents are dispersed over a large area and do not provide the basic amenities to meet even the elementary needs of such developments. These developments have tended to create imbalances in the structure of land-use resulting in increased commuter traffic, pressure on the city's services in respect of water supply, drainage, transportation, shopping, and CBD facilities. They have also caused the disappearance of land from the vicinity of the City. Because of lacuna in present law indiscriminates sub-division and utilisation of land for residential use has taken place

all over the Madras Metropolitan Area without the facility of proper roads, water supply, drainage or other social amenities. However, a number of steps have been taken to bring in a semblance of order in these matters. These include :

1. notification of revised building rules which include land-sub-division regulations in the rural areas outside the city ;
2. notification of revised building rules for the Corporation and Municipal areas ;
3. notification of rules to regulate multistorey and public buildings ;
4. notification of rules for provision of parking facilities ;
5. notification of rules for control of buildings around aerodrome ; and
6. instructions to all Government Departments and Quasi Government Agencies to obtain clearance from Madras Metropolitan Development Authority for all their projects which effect land use within the area before they are sent upto Government for financial sanction.

Nevertheless, the experience has been that with the multiplicity of such notifications and the existence of a large number of authorities without adequate understanding of the principles involved in these regulations or adequate staff to enforce them, the control of land and building use have become cumbersome without being effective.

Master Plan :

The Madras Metropolitan Development Authority is therefore in the process of formulating a set of development controls as part of the master plan it will be publishing as provided for under the Town and Country Planning Act. The purpose of the development control rules is to consolidate the numerous regulations under a single set of rules supplying the missing land use controls. While these rules will help in controlling the land use generally they will have to be followed up with detailed development plans for the different planning units constituting the Metropolitan Area.

Development Control Rules :

The salient features of the Development Control Rules are described below :

Under these proposed rules, the entire Madras Metropolitan Area will be divided into the following use zones :

1. Primary residential use zone.
2. Mixed residential use zone.
3. Commercial use zone.
4. Light Industrial use zone.
5. Heavy Industrial use zone.
6. Obnoxious and Hazardous Industrial use zone.
7. Institutional use zone.
8. Agricultural use zone.
8. Agricultural use zone.
9. Non-urban use zone.

All functional activities carried on within the Metropolitan Area will be accommodated in one or other of these nine use categories.

Separate limitation rules will be formulated for : (1) George town and other closely built up areas ; (2) other areas within Madras City ; and (3) Rest of the Metropolitan Area.

Detailed Development Plans :

For effective implementation of land and building use it will be necessary to prepare detailed development plans. For this purpose the area will be divided into 28 planning divisions, 16 within the city and 12 outside it. Each of these divisions in turn will be divided into several units. For the delimitation of these divisions there will

be a continuity of similar uses, density of populations and other functional characteristics and distinct physical features like river, canal, railway lines, major roads. The contents of such detailed plans are spelled out below in outline :

1. The laying out or relaying out of land, either vacant or already built up, as building sites ;
2. the construction, diversion, extension, alteration, improvement or closure of lanes, streets, roads and communications ;
3. the construction, alteration, removal or demolition of buildings, bridges and other structures ;
4. the acquisition by purchase, exchange or otherwise of any land or other immovable property within the area included in the detailed development plan whether required immediately or not ;
5. the redistribution of boundaries and the reconstitution of plots belonging to owners of property ;
6. the disposal by sale, exchange, lease or otherwise of land acquired or owned by the local planning authority ;
7. transport facilities ;
8. water supply ;
9. lighting ;
10. drainage inclusive of sewage and of surface draining and sewage disposal ;
11. the allotment or reservation of land for streets, roads, squares, houses, buildings for religious and charitable purposes, open spaces, gardens, recreation grounds, schools, markets, shops, factories, hospitals, dispensaries, public buildings and public purposes of all kinds and defining and demarcating of the reconstituted plots or the areas allotted to or reserved for, the above mentioned purposes ;
12. the construction of buildings generally and housing or rehousing of persons

displaced by the detailed development plan ;

13. the demarcation of places or objects and buildings of archaeological or historical interest or natural scenic beauty or actually used for religious purposes or regarded by the public with veneration ; or the protection of canal, tank or river sides, coastal areas and other places of natural or landscape beauty ;
14. the imposition of conditions and restrictions in regard to the character, density, architectural features and height of buildings the building or control lines for roads, railway lines and power supply lines and the purposes to which buildings or specified areas may or may not be appropriated and the provision and maintenance of sufficient open spaces about buildings.
15. the advance to the owners of land or buildings comprised within the detailed development plan upon such terms and conditions as may be provided by the said plan, of the whole or part of the amount required for the erection of buildings or for carrying out the works, alterations or improvements in accordance with the detailed development plan ;
16. the description of all lands either acquired or to be acquired ;
17. the particulars regarding the number and nature of houses to be provided by the local planning authority in cases where the detailed development plan provides for any housing or rehousing, the approximate extent of land to be acquired, the details of the land to be acquired and all matters supplemental, incident or consequential to such housing or rehousing ; and
18. the zoning regulations and regulations for enforcing or carrying out the provisions of the plan.

TABLE 1
LANDUSE BREAK-UP OF MADRAS CITY, 1964

<i>Land Use</i>	<i>Extent in hectare</i>	<i>Percentage to total area</i>	<i>Percentage to the developed area</i>
Residential	4,028.4	33.4	38.1
Commercial	410.0	3.2	3.7
Industrial	479.2	3.8	4.3
Public & Semi-Public	1,342.8	10.6	12.1
Open Spaces	429.6	3.4	3.9
Utility and Services	109.6	0.9	1.0
Transport and Communications	2,195.2	17.3	19.7
Vacant Lands	1,906.4	15.0	17.2
Non-Urban Uses	1,577.2	12.4	..
TOTAL	12,478.4	100.0	100.0

TABLE 2
LANDUSE BREAK-UP OF MADRAS METROPOLITAN AREA
(EXCLUDING MADRAS CITY), 1964

<i>Land Use</i>	<i>Extent in hectare</i>	<i>Percentage to the developed area</i>
Residential	3,318.4	19.6
Commercial	122.0	
Industrial	2,502.0	14.8
Public and Semi-Public	1,969.6	11.6
Open Spaces	1,194.4	7.1
Utility and Services	53.6	
Transport and Communication	2,890.8	17.1
Vacant	4,888.0	28.9
Non-Urban Uses	87,180.0	..

STATE LEVEL
CROPS YIELD
COMPETITION
FOR 1972-73

PRIZE WINNERS DECLARED

In the State Level Crop Competition for Paddy held during the year 1972-73, Thiru K. Pappi Reddiar, S/o. Kengi Reddiar, Kudakkal, Poolampatti Post, Sankari Taluk, Salem District was declared as the first prize winner. He has obtained 4,375 Kgs. of paddy per acre (dry-weight per acre). The total prize amount for the first prize is Rs. 2,000/

Thiru K. P. Duraiswamy, S/o. P. K. Periasamy Gounder, "Thadhakarakadu," Karavalasu Valaithottam Post, Kudumudi Block, Coimbatore District was declared as the second prize winner, for which the total prize amount is Rs. 1,500/-. He has obtained 3001.200 Kgs. of paddy per acre (Dry weight per acre).

Thiru P. S. Sankara Narayanan, S/o. P. S. Sivarama Iyer, Rayanasamudram, Kadayam, Tirunelveli district, was declared as the third prize winner for which the total prize amount is Rs. 500/-. He has obtained 2,780.700 Kgs. of paddy per acre (Dry weight per acre).

Thiru K. Pappi Reddiar, the first prize winner during 1972-73 was declared as the first prize winner in the competition for Paddy held during 1971-72, also and the Government of Tamil Nadu have conferred the title " " on Thiru K. Pappi Reddiar, for having won the first prize in the competition held during 1971-72.

PADDY CROP PRIZES—'73-'74

Thiru J. Shanmugam of Idappadi Block in Salem district, has been conferred the title of "Velanmai Chemmal" for his effort in paddy cultivation in the State Level crop Competition in Tamil Nadu for 1973-74. He got 4148.050 kg. of paddy per acre and was declared eligible for the First prize of Rs. 2,000.

Thiru S. Narayanaswamy Raja, Shanarpatti Block in Madurai district, who has produced 3664 kg. per acre, was declared winner of the second prize of Rs. 1000. The third prize of Rs. 500 will go to Thiru K. Maruthan Chettiar Thokkanaickenpalayam Block in Coimbatore district who produced 3637.8000 kg. per acre.

MOSCOW — GROWING IN WIDTH & HEIGHT

One hundred twenty thousand flats are built annually in Moscow, considerably more than in any other capital in the world.

Anyone coming to Moscow for the first time is surprised by the abundance of tower cranes rising to the skies from the city's numerous construction sites. This work is under way everywhere, both in the old sections that had been formed long ago and on the outskirts. But most of the cranes are to be seen in the new areas of mass-scale housing construction, which is a considerable distance away from the capital's centre, closer to the ring highway, which makes the city boundary today. The former small villages near the city have been replaced by broad streets with tall blocks of flats and green squares.

The last five-storey building was put up in Moscow in 1973, and all those going up now range from 9 to 16 and more storeys.

A qualitatively new stage in the capital's housing development has commenced: the construction of multistorey buildings from one and the same set of standard parts and structures. This makes it possible to put up buildings differing in size, configuration and look. The flats in them are more convenient than in the old type of houses.

Moscow has a firm reputation as one of the most green-covered cities in the world, what with its more than 150 parks and forest-parks. With every passing year the area of the city's greenery is increasing. In 1973 alone it expanded by 749 hectares. More than 1.5 million trees and bushes were planted in a single year through the efforts of the workers of the Road and City Improvement Department, and the population as a whole.



A panoramick view of the biggest residential sections in the Southern parts of Moscow

LONG TERM TOWN PLANNING IN USSR

By, ANATOLI ARCHIPENKO, APN COMMENTATOR.

By 1990, demographers believe, the Soviet population will be close to 300 million, with urban population making up 69 per cent of the total (at present—56 per cent). Consequently, some 400 new cities will have to appear on the country's map. The USSR national economic development plan for 1976—1990, which is being worked out at present, proposes to take up the challenging task of the future problems of town planning on an unprecedented scale.

The specific character of Soviet civil engineering lies in the fact that construction is conducted in extremely varied natural, climatic and national conditions of the country's numerous areas. Permafrost, loose grounds, seismicity, Arctic frosts, deserts, difficulties of combining modern operational requirements and national traditions in everyday life and architecture, development of quite new areas and reconstruction of centuries—old cities—this is a far-from-complete list of problems to be tackled.

PIONEER

The Moscow region has become a pioneer of the new system. In the past a scheme was approved for its district planning, which provides for limiting the growth of Moscow's population, rational distribution and inter-connected development of industry and agriculture, reconstruction of small and medium-sized cities and enlargement of rural communities bringing their amenities to city standards. There will be a united system of power and water supply, sewage, communications,

services, city and suburban transport. The same plan provides for protecting forests, lakes and rivers and for establishing new recreational zones. By 1990 the radical transformation of a vast area (29 Regions and Autonomous Republics) in the centre of the country will help to combine into a single process agricultural production, industrial processing of produce and transformation of villages into modern communities with all urban amenities.

MASTER PLANS

Master plans of development up to the year 2,000 have already been mapped out for most of the cities and 70 per cent of collective and state farms. Housing construction is given special attention in these plans. New projects of blocks of flats have been elaborated, taking into account peculiar features of different areas. Flats will be more roomy, and will have better finishing and equipment, will have more spacious kitchens, bathrooms and anterooms. On the other hand, the number of small flats will also increase.

Recently the Soviet Government has taken a decision on increasing the power of residential electrical networks and their switchover to 380/220 voltage by 1990, which will help to use electrical appliances and domestic machines on a large scale. Gas ranges will be gradually replaced with more hygienic electrical ones. Many household appliances—fridges, airconditioners, drying cabinets, washing-machines, dish-washers and vacuum cleaners — will be installed in flats during their construction.

URBANISATION— ROLE OF SMALL TOWNS

A natural corollary of population growth is urbanisation whereby population agglomerations of various sizes occur. Due to population explosion and the relatively high urban growth, the associated problems of urbanisation have reached acute proportions.

Polarised Urbanisation

While in the past urban centres developed due to historical reasons, industrial locations and concentration of non-agricultural activities of recent date, the mere increase in population and rural migration alone have caused extraordinary growth of urban centres in our country. The labour market and employment potential of major urban areas combined with the under-employment and poverty of rural areas accentuate the process of urban growth. Large cities of huge population content and concomitant problems of food, shelter, water supply, sewerage disposal, elementary sanitation and accessibility become the unavavoidable reality.

Benefits and Problems of Polarisation

These urban centres also form points of concentration of economic activities and points of polarisation of allied socio-cultural revolution. The concentration of economic activities enhance the economic opportunities with its "external economies, skilled man power pool, markets and national and international connections. The break with traditional values and traditional way of life, the lowr female content and the larger male segment of younger age in the population creates socio-cultural problems. The rural peasant with his life bordering on poverty is in no way better off even as an urban immigrant with his poverty and shattered values. In spite of its advantages for better industrial development, because of the resultant problems, polarised urbanisation is ruled out as a desirable type of agglomeration formation. An alternative system of urbanisation that will evolve a remedy to the ills of the present system has to be sought out.

Need for Decentralisation

Rapid urbanisation causes larger domestic markets for food. The increased agricultural production required for it is possible only where better supply of fertilizers, technical services, storage and marketing facilities, better accessibility and better mode of transportation are made available at the rural areas. This, in turn, presumes the availability of

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social, educational and technical services within reach of the rural areas to guide the agricultural operations. The heavy demand on the educated and skilled segment by metropolitan centres make their availability to the rural areas a rarity. Metropolitan or polarised urban growth is also inconsistent with modernisation of agriculture,

better utilisation of spatially dispersed natural resources and development of raw material oriented industries. The very need for modernisation of agriculture and rural development calls for a different but more desirable form of urban development, preferably a decentralised form of urbanisation.

Place of Small Town in Decentralisation Outline of Strategy

A decentralised urbanisation based on an integrated concept of development of a predefined region contemplates a sequence of hierarchical decentralisation of services and of production, administration and industrial location. In such a development, an organisation of hierarchical centres of development is expected to transmit the developmental process to the rural hinterland. These centres become the points of transmission of scientific knowledge for rural development and for absorption of excess rural man-power. This type of development also helps to create a pattern of regional integration that assures an easy and smooth transfer of people to the urban way of life and safeguards the continuity of family

TABLE I

GROWTH OF URBAN POPULATION IN TAMIL NADU

Year	Urban population	
	in lakhs	as percentage to the total population
1901	27.49	14.15
1911	31.83	15.06
1921	34.57	15.84
1931	42.70	18.20
1941	52.22	19.70
1951	73.67	24.35
1961	89.90	26.69
1971	124.45	30.28

life, traditional values and social controls. When the high cost of housing and infrastructure of centralised urbanisation and the per capita investment on town building is taken into account, the decentralised urban growth becomes more desirable.

Urbanisation in Tamilnadu — Extent, Size, Type

The growth of urban population in Tamilnadu has been gradual but consistent with the pace of growth of total population. It has grown four and a half times its size of 1901 in the past 70 years and is today nearly one-third of the total population. The urban growth in the past 70 years in the State is given in Table 1, in the preceding page.

Because of the availability of a well developed system of transportation, the development and distribution of urban centres in Tamilnadu has been thus spread out and decentralised. The ecological evolution of these agglomerations have been well controlled in the existence of organised local bodies.

Reclassification of Towns

Considering towns above 50,000 in population as major centres of popularisation and those below 5,000 in population as minor towns, the rest (*i.e.*) the third, fourth and fifth classes of towns, could be classified as small towns, comprised of the growth poles, marketing centres, small urban centres etc. The growth of the urban centres as per this classification is given in Tables IV and V.

The growth of major towns has been high in the last two decades and they in comparison, appear to have reached a stage of urban concentration that warrants steps to counteract their further growth. The increasing rates of growth of larger cities is one of the manifestations of the absence of integrated development. The relative loss of population in the small towns also reinforce such an inference. These towns, form the basic core of integrated development as central places or heirarchical centres in the distribution of urban places.

Strategy of Decentralisation

The State is covered by a heirarchical planning programme composed of interregional, regional, sub-regional and area development plans. The content of the Regional Plan will be :

1. A plan for the viable regions which will recognise the principles of rural urban continuum and provide for integrated development of rural and urban areas and
2. A sub-regional plan for units of the region comprising of a group of villages linked to an urban centre based on a heirarchy of settlements.

Small Towns as Connecting Link

The concept and philosophy of an area development programme with special reference to the development of rural reas, was studied in depth under a research project carried out in Tamil Nadu Pilot Research Project in Growth Centres. This Study was undertaken in Namakkal and Mohanur Blocks of Salem District and the following points emerged from these studies.

1. There exists micro-regions comprising of a number of functional rural communities with a service centre at top. In most cases such micro-regions correspond to a taluk with its headquarters town as its service centre. In the strategy of micro level planning choice of regional centre with its existing functions and already developed infrastructure will be a an advantage.
2. The rural areas lack a network of small sized towns or growth centres to provide an efficient marketing network and socio-economic services to the rural areas. The location or identification of these centres will help to transform the subsistence economy into a market oriented economy.
3. A cluster of villages with close functional ties forming a rural community should, therefore, be considered a viable unit for development programmes.

4. The present practice of planning urban centres independent of the needs of surrounding rural communities should be abandoned and in its place a strategy of planning a whole heirarchy of central places and their rural hinterland should be adopted.

The strategy of area development that emerged from this study was as follows :

1. the taluk should constitute the micro region and
2. a two tier heirarchy of centres be established below taluk headquarter town. The two-tier hierarchy should consist of a set of small towns or rural growth centres to serve a group of viable rural communities and a set of central villages to serve rural communities around them.

Heirarchically Organised Planning

By a combination of the strategies of planning for the sub-region and area development, a decentralisation of urbanism is sought to be achieved. With a set of Regional Plans it is intended to draw up programmes to arrest the trend of growth of major cities and guide and channel the urban flow into an organised heirarchical pattern of settlement distribution, assure the transfer of developmental techniques and benefits of economic development to the areas rural through 'spread effects.' The absorption of a migrant rural population, the evolution of supply and marketing centre and a pattern of heirarchical but functional urbanisation is contemplated in these plans. The programme when implemented will strengthen development of small towns and their distribution across the State in a balanced manner apart from discouraging further growth of large urban agglomerations with their attendant disadvantages.

TABLE II
SIZE AND NUMBER OF TOWNS IN TAMILNADU IN 1971

<i>Class of Towns</i>	<i>Size of Towns</i>	<i>No. of Towns in 1971</i>	<i>Percentage of urban population in each category of town</i>
I	1 Lakh & above	17	43.80
II	50,000—99,999	27	13.53
III	20,000—49,999	79	20.89
IV	10,000—19,999	117	13.38
V	5,000— 9,999	100	5.96
VI	5,000	103	2.44

The distribution of population in the different categories of urban centres is given in Table II :

The growth in the number and size of towns for the past 70 years is indicated in table III and makes an interesting study.

TABLE III
GROWTH IN THE NUMBER AND TYPE OF TOWNS IN TAMIL NADU 1901—1971

<i>Class of Towns</i>	<i>Year</i>								
	1971	1961	1951	1941	1931	1921	1911	1901	
I	17	11	8	6	5	4	3	3	
II	27	22	13	10	7	8	7	7	
III	79	60	55	38	35	22	22	17	
IV	117	96	81	71	62	61	57	53	
V	100	81	90	95	83	68	57	45	
VI	103	17	27	16	14	16	7	1	

TABLE IV
PERCENTAGE OF TOWNS IN EACH BROAD CATEGORY 1901—1971

<i>Type of Towns</i>	<i>Year</i>								
	1971	1961	1951	1941	1931	1921	1911	1901	
Major Towns ..	9.92	8.3	6.1	5.9	5.9	6.4	5.7	6.9	
Small Towns ..	66.81	81.1	84.8	87.8	87.7	85.1	89.9	91.6	
Minor Towns ..	23.25	10.6	9.1	6.3	6.4	8.5	4.4	1.5	

TABLE V
PERCENTAGE OF URBAN POPULATION IN EACH CATEGORY OF TOWN OVER THE YEARS

<i>Type of Towns</i>	<i>Year</i>								
	1971	1961	1951	1941	1931	1921	1911	1901	
Major Towns ..	57.33	51.9	46.4	41.6	39.5	39.2	37.1	40.5	
Small Towns ..	40.23	46.9	52.2	57.2	58.3	58.9	62.0	59.2	
Minor Towns ..	2.44	1.2	1.4	1.2	1.2	1.9	0.9	0.3	

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Use Siddha System And Improve Your Medicines

ANBAZHAGAN'S CALL TO ALLOPATHS

It was Thirumoolar — the Siddha of the Tamil Nadu who once said in his "Thirumanthiram 3,000" "Of making many medicines there is no end." The Siddha System of Medicine is one of the ancient systems contemporaneous with those of the submerged Minoan, Egyptian, Mesopotamian, Chinese and Grecian Medicines. The unique nature of this system is its continuous service to humanity for more than five thousand years in combating diseases and maintaining its physical, mental and moral health says, Thiru N. Kandaswamy Pillai formerly Project Officer, Literary Research Unit, Central Council for Research in Indian Medicine, Thanjavur Saraswathi Mahal.

The word "Siddha" means one who attained perfection (*Siddhi*) or Supernatural powers. Siddha is the only person who reassuringly answers the questions—Can the ugly death be dodged if not wiped out? Siddha says that the death may either be put off *Ad libitum* by a special course of re-strengthening and revitalizing the body, according to prescription so that it disappears in time in a celestial form from the world sense and find its permanent abode in the Transcendental Glory of Super Power. The Siddhas are Agamic (*Non-Aryan*) and Metem psychosists and their teachings are called Siddha Doctrines. Their Doctrinal culture embodies the self realisation through the practices of Yoga.

The Siddha seeks the dignity of man which necessarily implies the creation of social conditions which would allow him freedom to evolve along the lines of his own temperament and capacities. He seeks the harmony of individual efforts and social relations, not in a make shift way but within the frame work of the moral order. He seeks the creative art of life by the alchemy of which human limitations are progressively transmuted so that he is able to see the Almighty Supreme power in all and all in the Supreme Power. During the process of emancipation of his animate body into perpetual

inanimate energy form of body, there evolved a Medicine called "Kayakalpa Medicine" which in turn is called Siddha System of Medicine in modern times. The Kayakalpa Medicines will keep the body alive by increasing the span of life to longer periods without falling a prey to the least external environmental stress and strain and also to the internal dynamic psychomatic disturbances which are eventually expected to occur during the process of purifying and sanctifying the mundane body by yogic practice. Another great mystic achievement of the Siddha is the discovery of a substance called "Muppoo" which aids in the transmigration of animate body into inanimate energised form of body and it is also used for converting the Base metals into Higher order of Metals.

Much in Common with Ancient Systems

Siddha System of Medicine has much in common with those ancient medicines ; the enormous Pharmacopoeia containing vegetable, animal and mineral products, empirical treatments under the guise of Magic exorcism incantations, perigrination, mountaineering and similar activities, application of heat and cold, ointments, lotions, poultice, blood letting, counter irritation, massage, concentration on hygiene and diet, periodical use of purgatives and emetics ; and among drugs honey, salts, sulphate of mercury ; copper, lead, alum, brain, liver, bones, blood, skull, horns of various animals and tissues of reptiles are common in this system.

Many principles on which very efficacious Siddha Medicines are prepared and treatments given, make us believe that the Siddhas had a detailed understanding of many of the fundamentals of biology such as how enzymes work, how proteins perform mechanical, protective and catalytic function and how glucose is metabolized for energy. The knowledge of the enzymes, the Siddha put into practice, is really marvellous when we consider the different ordinarily inexplicable effec-

tive simple treatments of this system. Research studies on our system will reveal many forgotten fundamentals, the proper appreciation and developments of which will make this system grow to magnificent dimensions.

The primary requisite for any one who ventures to take to this field is to get himself disabused of the notion that modern science alone reveals and would reveal further, all the laws governing human existence and well being to the minute details, and there is nothing to be learned from our ancients who had not so much facilities to probe into the secrets of nature. One should have a correct knowledge of the background of this system, which, as all other ancient systems, was founded and developed by supermen of extra sense perception, who would dive deep into the innermost recesses of nature's secret than we, the moderns, with all the sophisticated appliances.

Their medical education was a mysterious process of professional initiation and apprenticeship on the top, where, there were two wings ; one, concentrating upon theory, doctrine, and systems ; the other, remaining with the sick people concentrating on studying the diseases and patients by methods of physical examination, taking comprehensive, as well as accurate account of their illness by intensive observation. The one we may call scientists and the other, practitioners. The medical man who would maintain the health of the community and the individual, cure the sick, pass on the known and well established information to wider circles and younger generation was brought under the general medical education, the distinctive feature of which is the thoroughness with which the theoretical and scientific knowledge are fused with what experience teaches in the practical responsibility of taking care of human beings, and the training of the student's sight, hearing, touch and the sense of smell and taste, in studying diseases.

Siddhas are superhuman beings to whom mastering the winds, waves tides, gravity and other elements and forces of nature are not im-

possible tasks. They yearned to harness the energies of love in the service of God and humanity and build up values around the eternal virtues fully realising that the physical body is only a carrier of the life enveloping the soul which is on the way to everlasting bliss, and we are all tourists on this earth which we should leave sooner or later quitting every thing hired to us, having a good time on this trip making ourselves and the fellow tourists happy, and keeping unsoiled the things hired to us. As the physical body plays an important role in our tour it becomes our duty to keep it pure and perfect by regulating energy forces existing in every individual, supplying necessary fuel to achieve proper balance which is health, and avoiding imbalances which is illness.

The Siddha Literature

The evolution of this literature may be classified into :

- (1) Pre-historical or Pre-classical period;
- (2) Classical period or Historical period and
- (3) Post classical period or Modern period.

The period of pre-historical or Pre-classical period may be said to cover a long vista of time *i.e.*, first and second Tamizh Sangam periods 10,000 B.C. to 700 B.C. Classical period may be said to cover a period of Historical events *i.e.*, Third Sangam Period 700 B.C. to 300 A.D. Post classical period or Modern Period may be said to cover the period taken from the establishment of British rule up-to-date.

The Pioneers of Siddha Medicine

Agaththiyar of First Tamizh Sangam is said to be the earliest writer on Medicine and is considered the highest authority in Siddha. He survived and propagated the Siddha doctrines to his twelve disciples in the First Tamil Sangam period. His contribution to Medicine in his writing is called *Agaththiyar 12,000*. Though it has been printed yet it is not available in the market for sale.

Agaththiyar of Second Sangam or pre-classical period is said to have come from North and is said to have settled at Pothikai Hills in the South where he attained Siddhi. He had written innumerable works on medicine that are now available in this State.

Thirumoolar : There were two schools of Medical Knowledge consisting of some distinguished Siddhars known as *Agaththiyar Varga* and *Moola Varga Siddhars* during the classical period. *Thirumoolar* is the head of the *Moolavarga Siddhars*. He belongs to the period of classical Medicine period *i.e.*, 300 B.C. (Some Tamil Scholars are of opinion that he survived between 600 and 900 A.D.). He is the author of "*Thirumanthiram 3000*" which deals, among others, with the Fundamental principles of Siddha Medicine based on the Siva cult. There are several medicinal works written by him which contain valuable prescriptions.

Bhogar : He belongs to *Moola Varga Siddhars* and a disciple of *Thirumoolar*. He contributed a lot to Siddha Medicine. He composed 7000 stanzas called *Bogar Saptha Kadam*. He is said to have visited China many times where he propagated the knowledge of Siddha Medicine. His disciple called *Pulipani* had written many treatises on Medicine. *Kalangi* is another disciple who served at *Kanchanai Malai* at *Salem District*.

Thiruvalluvar : He lived in the classical medicine period *i.e.*, 100 B.C. Though he is the author of *Thirukkural* yet he had contributed to Medicine also *i.e.*, *Thiruvalluvar gnana Vettiyan*.

Theraiyar, Yugimuni, Machchamuni, Sattamuni, Konganar, Karuvooar, Ramathevar : These Siddhars have survived during the last period of classical Medicine, and several lakhs of stanzas were contributed by them on Siddha Medicine. One among them *Rama Thevar* had travelled Arabia, Persia, and Turkey where they propagated the knowledge of Siddha Medicine.

Thiruvallargal Mangadu Vadivelu Mudaliar, Vallai Shanmuga Sundara Mudaliar, Viruthai Sivagnana Yogi, Kaniga Puthoor Murugesu Mudaliar and Pandit Anandam were the reputed Siddha Physicians of Modern time and they have contributed to Siddha System of Medicine. They are responsible for the codification and compilation of the Siddha literature in Tamil Nadu.

The knowledge of certain special features of Siddha system has been derived from the excavations at *Mohenjodaro*. They are briefly as follows :

1. Certain special medicines were in use, namely, stag's horn and silajit. Metallic salts were used as preservatives. Neem tree was regarded as sacred. Margosa leaves were used in the case of small-pox, the idea being to ward off evil spirits. This was perhaps due to the germicidal action and the medicinal properties of Margosa. Sir John Marshall has observed that tree worship was essentially a characteristic of the pre-Aryan. In every temple in South India there is a holy tree.

2. The science of chemistry was well developed in the Siddha system. Its origin goes back to very ancient times, long before the Christian era. The Siddhars had a good knowledge of the healing properties of many minerals, animal products and plants. The Siddhars were acquainted with the processes of calcination, preparation of essences, extracts from minerals, and the preparation of "muppu" in order to make mercury pills of Kattur with high potency, which is an elixir for the prolongation of human life. They knew how to use mercury and arsenic effectively in medical practice. Mercury was used in the treatment of venereal diseases and leprosy etc.

3. The knowledge of chemistry was closely linked with alchemy, and attempts were made to transmute baser metals into gold.

4. Special attention was paid to the examination of the 'Nadi' (*Pulse*) in the Diagnosis of disease. This art is highly developed among Siddhars and with great effect. There is a treatise on 'Nadi' by 18 Siddhars.

5. Certain fruits such as lemon, lemon juice and lemon peel were freely used for therapeutic purposes.

Tamilians had very early connection with Egypt and Babylonia, and this influenced their knowledge of medicine.

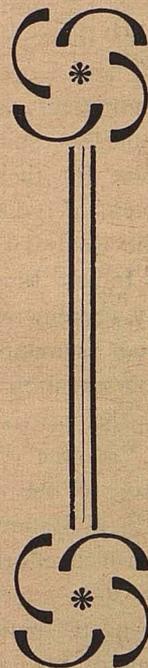
The Siddha system contains many valuable therapeutic agents which should be studied scientifically. They will be very valuable additions to our modern Pharmacopoea.

The Time-Honoured

The survival of Unani Tibb depends on the capacity and zeal with which the message of its effectiveness is carried to the masses not by sentimental appeals but by proven cures of which the sound principles and methods of treating diseases with time-honoured recipes are living testimony. These actually have sustained the Unani System of Medicine over the centuries. Go on following your principles and methods and by all means make them more perfect by imbibing knowledge and techniques available in other sciences. Your principle should not be adoption of these methods and techniques but their adaptation. Only in this way could our medical heritage be kept up and preserved.

Here I would like to emphasise one point. All systems of medicine require a certain discipline and an adherence to principles. The charm of a profession lies not merely in its confidant to certain individuals or groups but in its proliferation to large number of people so that the art of healing may have numerous followers who would provide service to the maximum numbers of suffering humanity. Their task can become easier and their performances comparable if they could develop a standard pattern of work and assessment so that the results of their work could be judged statistically by uniform scientific standards. I, therefore, appeal that in case we want Unani Tibb to flourish further and to compete in effectiveness with other systems, we must follow a uniform standard both in teaching as also in the reporting and recording of data. There is yet another aspect which has not been attended to properly. Efforts should be made to produce literature in all regional languages giving the basic

PRINCIPLE OF UNANI SYSTEM



“To make Unani Tibbi flourish further and compete in effectiveness with other systems, we should follow a uniform standard in teaching as also in the reporting and recording of data. In addition, efforts should also be made to produce literature in all regional languages giving the basic principles and common remedies of Unani Tibbi understandable to laymen.” observes the author **Thiru A. K. N. ISAQUE** in his speech.

principles and common remedies of Unani Tibb understandable to laymen. This may be divided in two sections :—

- (i) Hygiene, which deals with the principles of health and practice for the maintenance and preservation of health, and
- (ii) General principles of treatment and common remedies available in the area around the patient's habitat.

The Unani System of Medicine can make a distinct contribution in this regard.

I may also mention that your profession possesses the salient ingredients to foster the country's well being. Only, you have to realise your potentiality and march ahead with determination to achieve the social goal. I wish to make a suggestion that the All India Unani Tibbi Conference should launch a countrywide programme to start free Unani dispensaries in as many centres as possible under the auspices of the various units of the conference functioning in different parts of the country. These dispensaries can augment and supplement the efforts of the Central and State Governments in this direction. These units can also form centres where the local Unani practitioners can gather once in a fortnight or a month to discuss their activities and exchange their experience in the profession. The All India Unani Tibbi Conference can also organise at some of these centres refresher courses for the benefit of the Unani medical practitioners.

The rich and valuable legacy of knowledge of drugs and medicinal preparations in Unani Tibb, unherited by us, demands greater attention, serious study and thorough investigation. **The Unani System of Medicine, I am told, is much nearer to the modern systems as compared to other systems of medicine.** History tells us that the Arabs preserved and developed the Pharmaceutic Art and carried the torch of professional and scientific knowledge from the sixth to the thirteenth centuries. **The Arabs perpetuated it has been said that Arabian medicine is a composite blend of Greek medicine, of the medical practice of the Jews, and of the astrology and occult lore of Egypt and India.** Geber or, Jabir ibn Hayyan, as he is commonly known to the students of the Unani Tibb, is the first of the chemical authorities who describes in detail the operations of distillation, sublimation and calcination. He is the reputed discoverer of sulphuric acid, oil of vitriol, of nitric acid, aqua regia, as well as corrosive sublimate and lunar caustics. After Jabir ibn Hayyan, the names of Mesue, Hunain ibn Ishaq, Rhazes and Avicenna are worth mentioning—Rhazes is said to have been instrumental in introducing the extensive use of mercurial ointment both among the Arabs and in the Western World, the famous “Canon of Medicine” of Avicenna is in five volumes ; the second is devoted to “single drugs” and the fifth to the “compound recipes.” Avicenna speaks of the silvering and gilding of pills. He is said to have introduced this practice into pharmacy.

Rauwolfia Serpentina :

The early part of the present century witnessed the untiring efforts of one of the illustrious sons of India, the late Masin-ul-Mulk Hakim Ajmak Khan who was an early pioneer, to establish an institute for conducting research on the drugs of the Unani and Ayurvedic

materia medica on modern scientific lines. But he passed away before he could see his idea fully realised. The institute, however, was established under the able directorship of Dr. Salim-uz-Zaman Siddiqui and we all know about his research on Asraul (*Rauwolfia Serpentina*) in this institute. **Dr. Siddiqui isolated Ajmalin and earned international recognition for his work.** Much work has been reported since. But such activities are few and far between. The Government of India attaches very great importance to all round scientific investigations of Unani, Siddha and Ayurvedic drugs and medicinal preparations. The Government of India have set up the Ayurvedic and Unani Pharmacopoeial Committees to prepare official formularies and standard pharmacopoeiae for these systems. The Government of India have also established the Central Council for Research in Indian Medicine and Homoeopathy wherein, among other activities, drugs standardisation is being given due attention. With the extension of the provisions, in a limited way, of the Drugs and Cosmetics Act to the Ayurvedic, Siddha and Unani Systems of Medicine and intensified efforts to develop standards it is hoped that the practitioners and the patients of the Indian Systems of Medicine will be able to have genuine and potent medicines.

The Central Council for Research in Indian Medicine and Homeopathy has established a Central Research Institute for Unani at Hyderabad with a 50-bedded hospital attached to it. The results of the research work carried out at this institute have so far been encouraging. The Council has also established units for clinical research, literary research, drug research and drugs standardisation research and it is estimated that the expenditure on research in the Unani Systems

of Medicine will be to the extent of Rs. 7 lakhs during the current financial year.

The Government of India has also established two post-graduate departments, one at the Aligarh Muslim University in the subject of “Idmul Adviya” and the other at Nizamiah Tibbi College, Hyderabad in the subject of “Moalijat.” The Government of India attaches great importance to the post-graduate education and research in the Unani and other systems of medicines. During the Fifth Five Year Plan it is proposed to extend financial assistance to the extent of Rs. 19 lakhs for the establishment and/or development of a pharmacy to manufacture Ayurvedic, Siddha and Unani medicines by the State Governments.

You are all aware that the Central Council of India Medicine has been established under an Act of Parliament with a view to bring about uniformity in education and regulation of practice in the Indian Systems of Medicine. Many of the eminent Unani practitioners, educationists and experts are represented on the Council and I hope that very soon we will be able to achieve uniformity in education in the Unani System of Medicine throughout the country.

I may mention here a quotation from Buqrat (Hippocrates), the Father of Medicine, and in whose name every medical student takes his oath on his graduation, which is very relevant today—

“The healing art consists in drawing off of what is over abundant and supplying of what is deficient, and whoever can do these things is the best physician.”

When we want to emphasise the fact that the heart is working well we say "it's going like clock-work." But suddenly disease strikes and that precision is disrupted. Our "motor" either begins to throb feverishly, or to push into the rib cage slowly and miss its beats. This is not a catastrophe yet, but it may be if we don't come to the aid of the heart in time, restoring its usual rhythm. One way to do this is by electrical stimulation of the heart. All the cardiac units in our hospitals are equipped with such stimulators and automatic monitors which help attending nurses to rush to the aid of patients in distress.

Do you want to look at what exactly is the heart-beat that sustains our life? The heart beats because a special node of nervous tissue, called the pace-maker, constantly sends impulses which, passing a second, regulating node, reach the ventricles of the heart and cause them to contract. From the second node to various parts of the ventricles the impulse travels a ramified nerve path. It is on this path that trouble lies in store for us.

As a result of a disease like myocardial infraction, for example, the nerve path may be blocked at some point. Doctors call this an atrioventricular block. It blocks the impulse sent by the pace-maker, after which the heart stops and the patient begins to have the dreaded heart attack. Fortunately, this is not always fatal. Nature thoughtfully provided for a stand-in. Each of the sectors of the nerve path that are located below the afflicted place can take on the function of a pace-maker which again "turns on" the heart. This only gives one a breathing space, however. The new pace-maker sends impulses considerably less frequently, it is not adapted to prolonged work and, as a rule, wears out quickly. At one time death was inevitable at this stage of the disease. Today such patients return to a normal life after an artificial pace-maker is installed.

The first pace-makers were large, uncomfortable, and hard to control. They were not implanted in the body of the patient, but were worn externally. As a result infection could penetrate the patient's body

ENGINEERING

THE

HEART - BEAT

FEATS OF

BIO-MED.

ENGINEERS

along the electrodes, and this of course had extremely serious consequences.

But of late the design of these devices and electrodes have been perfected and improved. The way they are connected to the heart, has also been perfected thereby preventing all kinds of complications.

Three basic kinds of electrocardiostimulators are now used. The most common are fixed-rhythm devices. They send the correct number of impulses per minute necessary for the normal working of the heart. In some people, the natural rhythm is sometimes temporarily re-established after this, and this kind of "competition" of rhythms could lead to complications. In this case we use bioregulated stimulators with feedback. They work only when the impulse of the natural pace-maker does not reach the heart, but as soon as the disrupted connection is re-established, they switch off. And finally, there are bioregulated electrocardiostimulators which, with the help of an "electronic bridge," re-establish the synchronous work of the auricles and ventricles of the heart. One electrode of this stimulator is connected to the natural pace-maker and the other to one of the ventricles. The device receives the impulses of the natural pace-maker.

amplifies them and sends them to the heart. When necessary, it regulates the number of heart contractions. If, for example, as a result of excitation, or physical exertion, the pace-maker sends 150 impulses per minute, only the necessary 75 reach the heart.

Most of the stimulators that we now use are implanted in the body. This is comfortable and safe. External devices are used only in special cases for short periods of time.

Ways of Implanting Pace-maker

There are two ways of implanting a pace-maker. In the first, the chest is opened up and the electrode sewn on to the heart. In the second, the electrode is introduced into the heart cavity through one of the peripheral veins (usually in the area of the clavicle). Of these two methods, preference is given to the second method. It requires a considerable amount of skill on the part of the surgeon, but it is more easily tolerated by the patient. Most patients already start walking about on the day after the operation, and soon return to normal activity. The electrocardiostimulators work for three to five years, during which time we keep a check on the patient's condition.

This much for the patients whose heart action is reduced. The situation is more complicated with people suffering from tachycardia, where the heart beats at a rate of 200 or more per minute. In these cases, the heart is not usually controlled by a stimulator. What is needed are devices that not simply impose their rhythm, but regulate the activity of the heart on the basis of its functional peculiarities. It is in this field that bio-medical engineering has come to play a large part. We are developing a number of such devices in co-operation with these bio-medical engineers. For example, together with scientists from the department of electronics at the Moscow Engineering and Physics Institute, an experimental model of a device which can regulate impulse characteristics has been developed. With the help of this device, it is possible to successfully treat patients suffering from tachycardia. As a further step, work on ways to completely automate the process of controlling the frequency of heart contractions, is now going on.

Rhythm comes naturally to man; in fact everything in creation moves to it. It is man's oldest impulse. The ceremonial dancing of primitive man was a great outlet for his emotions, pleasurable or otherwise ; whether while scaring away enemies or while appeasing God. This basic rhythm in man led him to standardise the various types of emotional expression he was familiar with and to create and design rhythmic instruments.

The earliest and simplest accompaniment to the dances of primitive man were their hands and feet. They marked time by clapping their hands and stamping their feet in simple rhythms. Sometimes they beat upon their chests, flanks and bellies with their hands to keep time. These methods might well have been the first pointers to the drum.

Drums :

A casual banging on a hollow gourd or a human skull might have suggested to primitive man that sound could be amplified by the use of hollowed-out materials. Large blocks of hollowed-out wood covered at both ends were used. They were beaten with thick sticks. The Kanjira, the tambourine and all drums with open frames are extremely simple in construction. The conical drum belongs to this category. The skin is stretched over a pot which serves as a resonator. Such drums have been in common use since very early times. The bheri and the dundubbi, still survive in the modern nagara and its variations.

The mridhanga is considered to be the most ancient of the Indian drums. This is a highly developed percussion instrument in that it has an accuracy of pitch and a variety of tone which are uncommon in similar instruments in any other country. Due to its tonal superiority this instrument plays a vital role in a concert of carnatic music.

A development of the ancient pot drum is the Panchamukha Vadyam, literally the five-mouthed instrument. The mouths are covered with stretched skin and the musician plays on them with both hands. This instrument could be found at Tiruvarur and Tiruvanaikaval. There is a sculpture in then famous temple at Chidambaram where the Panchamuga Vadyam features, along with two side drums.

The Musical I N S T R U M E N T S of Tamil Nadu

Wind Instruments :

Wind instruments particularly those belonging to the horn group, are essentially meant to be played in the open air. They are used during festivals and other ceremonial occasions.

The ancestor of all metallic horns is the curved buffalo horn. The rather terrifying sound of the horn was associated with all sorts of ceremonial and magical rites of primitive people. The horn was made use of for giving signals —to summon an army, to announce important events, to issue public invitations for festivals and processions.

One of the earliest wind instruments to develop was the flute. Necessary air was blown through a bamboo by the mouth. As the next stage finger-holes were invented to have varied notes.

The evolution of the Nagaswaram is from a double reed.

Stringed Instruments :

The first stringed instrument invented by man was the hunters bow. The pleasant humming sound produced when the bow string was twanged must have been the basic principle for the stringed instrument. A piece of skin stretched over a hollow body such as a pot which produced a sound of relatively great volume when caused to vibrate. To increase the volume of sound one end of a string was fastened to a drum which acted as a resonator. One end of the bow was given the shape of a hollow boat and a skin was stretched tightly over it. Several strings were merely tied round the bow shaft and could be tuned only by an elaborate process of unfastening and refastening. This type of bow-shaped Veena was apparently very widely used in ancient days as it is frequently represented in sculptures dating from the 3rd century B.C. Such an instrument was called yazh in Tamil. The yazh is mentioned in several works of Tamil literature.

The construction of instruments with a finger board which is separate from the body is the next stage of development. The instrument has a long neck, as in the tambura and the Veena.

A proto type of the first kind is a device where a stick is inserted into a small, resonating body such as a tortoise shell or coconut shell and a string attached to it. By pressing the string against the neck or by touching it lightly with the fingers, the string is shortened, thereby raising the pitch. The variation in the sound is according to the length of the strings. This led to the use of fretted instruments where the player could determine the pitch by varying, with his fingers, the length of the string that is to vibrate. This enables more than one note to be produced on the string. The kinnari and its variations belong to this primitive group. The Saraswati Veena is an example of a fretted instrument. This is the representation of the highly developed stringed instruments of today.

TAMBURA

The Tambura is one of the classical instruments of the stringed group. It is used all over India for drone accompaniment and its varieties are numberless. With its powerful and resonant drone, it forms a perfect base for the human voice.

The tambura looks like the Veena in appearance. It has only one bowl. It is usually a large one, from ten inches to one and a half feet wide. The best tamburas are made of jackwood or a hollowed-out gourd. The overall length of the instrument varies from three and a half feet to five feet. The belly is usually slightly convex. The bridge placed on the bowl in the centre, is made of wood or ivory.

There are four metal strings, three made of steel and the fourth and lowest one of brass. The strings pass through holes in a ledge near the peg. The tuning pegs of the first and second strings are fixed at the side of the neck; those of the third and fourth strings are at right angles to the head. Little pieces of silk or wool placed in certain portions between the strings and the main bridge serve to improve the tonal effect and enable one to hear the overtones of each string clearly.

The strings are attached directly to the narrow ledge fixed to the body. There are beads threaded upon the strings, between the bridge and the attachment to which they are secured. These beads pushed down in the direction of the attachment, act like a wedge between the belly and the strings; by thus stretching the strings, they serve to alter the pitch as required. This contrivance renders accurate tuning easier.

Tamburas manufactured at Thanjavur are beautifully carved and ornamented with ivory.

VEENA

The Veena is the classical instrument of India. It is the instrument par excellence for rendering Indian music and rightly occupies the first and most honourable place amongst Indian musical instruments. It is the instrument associated with Saraswati, Goddess of learning and Narada, the Divine Musician and sage.

The Saraswati Veena is the modern South Indian Veena with 24 fixed frets, twelve for each octave. This type of Veena is only 3 centuries old and was introduced by Raghunatha Naik of Tanjore and assisted by his able Prime Minister Govinda Dikshitar.

The Veena consists of a large pear-shaped bowl called Kudam, hollowed out of a single block of wood; generally jackwood. The flat top of the bowl is about a foot in diameter. At its centre is a bridge. The stem is also made of the same kind of wood. The stem leads on to the neck which is curved downwards and its tip is carved into the head of a yali. On the other side of the stem near the neck is fixed a smaller gourd which serves both as a rest and a resonator. Twenty four metallic frets, are fixed on the stem by means of a resinous substance. The frets are made of bell-metal or steel.

The Veena has seven strings, four main strings intended for playing music and three side strings intended for sounding the drone notes and also for keeping the tune. These strings pass over an arched bridge made of brass. They lie flat over the top of the body and are secured to the main bridge.

The fixing of the frets paved the way for the development of the famous scheme of seventy-two melakartas of the carnatic system. The style of presenting carnatic music has grown largely round the Veena technique. Many of the noted South Indian musicians, musicologists and composers of the past have been Veena players.

GOTTUVADYAM

The Gottuvadyam is one of the concert instruments belonging to the stringed variety. It is similar to the Veena, the main difference being that unlike the Veena, it has no frets.

The gottuvadyam consists of a pear-shaped bowl which is scooped out of a block of wood. Six main strings pass over the bridge on the top of the bowl. There are three side strings for the drone and the rhythmic effect. There are a few sympathetic strings which pass over a small bridge beneath the main bridge.

The instrument is played by moving a cylindrical piece of heavy polished wood or horn over the strings. The gottuvadyam has a range of four to four and a half octaves. Raga alapana, tanam and Pallavi and other musical forms that are played on the Veena can be rendered on this instrument. Most of the gamakas and graces can be brought out beautifully.

The gottuvadyam is an instrument for solo playing. It has been in vogue for the past 70 or 80 years. The famous musician Sakharam Rao of Tiruvidaimaruthur brought it into vogue.

Thanjavur is noted for the manufacture of this instrument which has elaborate ornamentation and silver mounting.

NAGASWARAM

The music of India originated in her temples. Even today, temples and religious institutions in the South support and maintain musical ensembles of various types, vocal and instrumental. The latter includes the nagaswaram, drums, and pipes which form an integral part of certain religious services.

The nagaswaram is a double-reeded instrument with a conical bore that flares out towards the bottom end. It usually consists of twelve holes, the upper seven of which alone are used for playing. The other five, called brahmaswaram, are stopped with wax, at the discretion of the performer so as to regulate the pitch. The reed is fixed on a metal staple and mounted on the top. The reed used in the nagaswaram is found on the banks of the Cauveri.

The length of the nagaswaram is two to two and a half feet. The body is usually made of wood. Occasionally one comes across instruments made of silver and even gold. The accessories to the nagaswaram, spare reeds and an ivory needle with which the reeds are cleared and adjusted are attached to the mouth piece.

The different styles and subtle graces of karnatak music can be effectively brought out on this instrument, not only by the partial opening and closing of the finger holes, but also by the manipulation of the lips and tongue upon the reed.

There are two varieties of nagaswaram, the be in type and timiri type. The former is a slightly bigger one and experts as a rule use it in preference to the timiri type.

The nagaswaram is always accompanied by the shruti which is called ottu. This instrument is similar to the nagaswaram but slightly bigger in size with five or six holes at the lower end. These holes are wholly or partially closed to tune the drone to the desired pitch.

The accompanying percussion instrument is called Taval. This instrument is special to the nagaswaram and ideally suited to open air performances. In addition to the taval, the talam, which are cymbals are made of bell metal, are used to keep time.

The nagaswaram, being especially an outdoor instrument, is employed on all festive occasions whether domestic or public, religious or ceremonial. It is also used in processions and in temple music. The repertoire of the player is large and varied and there are melodies suitable for processions in honour of temple deities, for the celebration of marriages, for rejoicings, for welcoming, for departures ; in fact it is considered an auspicious symbol.

The music played on the nagaswaram is usually a pure and serious type. However, the instrument is also very largely used in folk music and in the temples of the village deities during festivals.

Being essentially an outdoor instrument, the nagaswaram does not sound pleasing at close range. However, at a distance, the effect is greatly subdued and in the open air, the strains of the nagaswaram often attain a wild beauty and softness.

VIOLIN

Today, the violin has become an integral part of any musical concert of karnatak music where it accompanies the main artist, vocal or instrumental. The violin is one of the earliest foreign instruments to be adopted by Indian music. Thiru Varahapayya, a Minister to the Maratha rulers of Thanjavur and an adept in carnatic music was attracted by the rich tonal quality of the violin which he heard in the European band of the East India

Company. He explored the possibilities of this instrument to enrich Indian music.

The violin is remarkable for its smooth sweeps from one end of the string to the other. The light tone of the steel string and the deep, almost human tone of the fourth string are wonderfully expressive. All these and the facility to play the gamakas and embellishments peculiar to Indian music, especially to Carnatic music, have made the violin irrevocably Indian.

FLUTE

One of the earliest instruments of the wind variety is the flute. It is one of the three celebrated musical instruments of India, the other two being the Veena and the mridanga.

The flute is of very great antiquity. The instrument is a simple cylindrical tube, mostly of bamboo, of uniform bore, closed at one end. There are different kinds of flutes. Their lengths and number of holes vary. The length varies from eight inches to two and a half feet. Long flutes have a rich, deep and mellow tone whereas in small flutes the tone is light and high pitched.

In addition to the mouth hole, there are six to eight holes arranged in a straight line. The range of the flute is two and half octaves.

MRIDANGAM

The Mridangam is perhaps the most highly developed and the most ancient of all percussion instruments. It is commonly used as an accompaniment to the vocal and instrumental performances.

The mridangam is hollowed out of a block of wood. It is cylindrical in shape and its length varies from one and a half to two feet. A skin is stretched tight over both the openings. The skin is fastened to leather loops held taut by interlaced leather braces which pass along the length of the mridangam. In between the braces and the wall of the instrument are wedged round blocks of wood which can alter the pitch of the instrument if pushed up or down.

A mixture of flour and water is worked on to the middle of the left side to lower the tone to the desired

pitch. This plaster adds to the resonance and gives a full, bass sound. The plaster is carefully removed after use. The two heads are generally tuned an octave apart. The centre of the right side has a permanent coating of a black substance called soru, Karanai and marundu. It is a mixture of boiled rice, manganese dust, iron filings and other substances. It is this black layer that gives its characteristic tone to the mridangam and facilitate tuning to a particular pitch.

A wide variety of tone is obtained from the different parts of the instrument in a number of ways. By striking the head with a full hand or with fingers, which are clamped or released. The parts of the head which are struck are the rim of the wall on the right side over which the straps are passed, the drum head around the black 'eye' and the eye itself. The types of strokes are distinguished by an elaborate percussion terminology (Jatis). The alteration of sound between two heads of the mridangam further enriches the tone.

The mridangam is used as an instrument of accompaniment, but in every recital of classical music, vocal or instrumental, there is a short solo piece on the mridangam. This often comes after the elaboration of Pallavi. Here the mridangam improvises on the tala of the pallavi giving particular attention to the shape of the melody that has preceded it.

KANJIRA

The kanjira is one of the most ancient musical instruments of the percussion variety. It is used for accompanying folk songs and devotional music.

Very simple in construction, the kanjira consists of a circular wooden frame about ten inches in diameter and two and a half inches broad. Across one side a skin, preferably that of the wild lizard, is stretched. The other side is uncovered. The frame is provided with three or four slits and a few pieces of metal or coins are inserted in a cross-bar inside the slit. A jingling sound is heard when the instrument is moved. The kanjira is held in the left hand and the palm and fingers of the right hand, one used to strike the skin to produce the variations. A

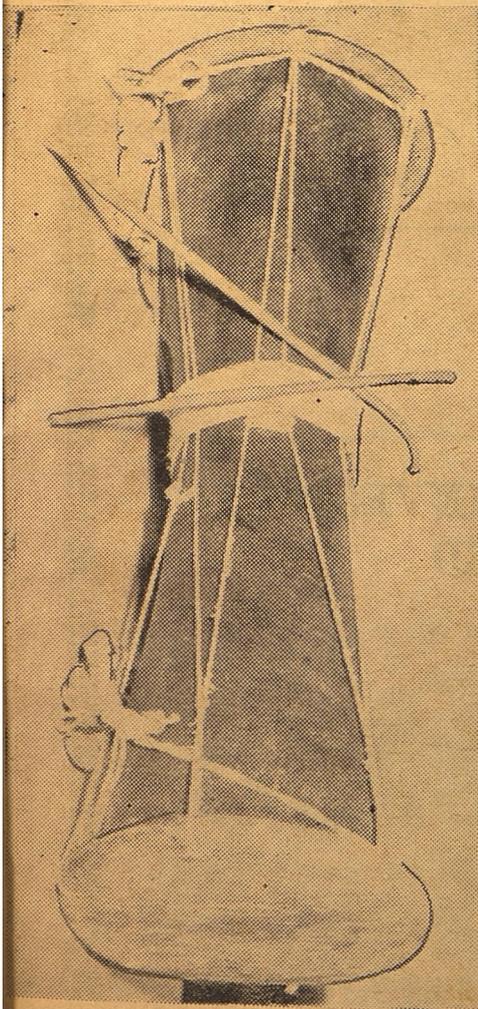
little water is applied to the stretched skin which reduces the tension to its required pitch.

In a classical concert, the *kanjira* is used to supplement the *mridangam*.

TAVIL

The *tavil* consists of a barrel-shaped shell hollowed out of a solid block of wood. On both the sides, the skin is stretched over hoops made of hemp and six or seven bamboo sticks bundled together. The hoops are fastened to the shell by means of interlaced leather thongs. A band of leather passing round the shell along the middle over the braces serves to tighten the instrument upto the desired pitch. The right side is played with the right hand, the wrist and the fingers. While the left is played with a stout stick. The skin on the right side is stretched very tight but not tuned to any definite pitch.

Urimi



During a *nagaswaram* recital, the *tavil* maintains a subdued rhythm even during the *raga alapana*. The *tanam* is interspersed with bright passages on the *tavil*.

GHATAM

The *ghatam* is an earthen pot with a narrow mouth and a big belly.

The *ghatam* finds a place of honour in classical music concerts.

The clay used for making the *ghatam* is mixed with iron filings and then baked. *Panruti* and *Manamadurai* are noted for the manufacture of strong, durable and resonant *ghatams* suitable for classical music.

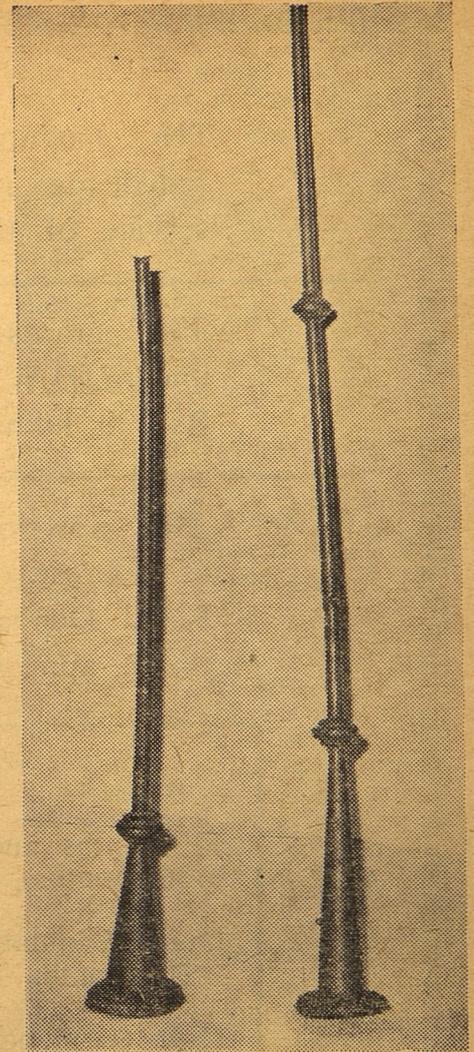
The *ghatam* is played by both the hands, the wrists, the ten fingers and nails. The mouth of the pot is pressed against the stomach. The strokes are given at the neck, the centre and the bottom of the outer surfaces achieve very considerable tonal variety. Very fast tempos in rhythmic patterns could be brought out.

MOHARSING

The *Moharsing* is made of wrought iron and resembles the head of a trident. A small resilient steel strip is soldered to a more or less circular brace. Passing through the centre of the brace, this steel tongue protrudes just a little above its "neck", finishing in a short continuation piece which is bent at right angles.

The instrument is held between the thumb and forefinger of the left hand and the portion where it narrows down is held between the teeth. The performer moves the little steel 'tongue' to and fro and by making the cavity of his mouth bigger or smaller and by carefully manipulating the tongue and the breath, various sounds are produced. The strip itself is obviously capable of only one note, but the harmonics of this note become available by resonance through varieties in the shape of the mouth cavity. A small piece of wax applied at the tip of the strip reduces the pitch if desired.

The *moharsing* is placed along with the *mridangam* in a concert. A skilful performer is able to bring out the various rhythmic patterns and variations of the *mridangam* with accuracy.



Tiruchinnam

Ekkalam

GETTUVADYAM

The *gettuvadyam* is one of the rare stringed instruments. It is like an ordinary *tambura* with a support at the neck and there are four strings. The performer strikes all the strings simultaneously with two light bamboo blades held in both hands. The left hand strikes the strings with regular rhythmic beats and the right hand plays intricate patterns that are reminiscent of the *mridangam*.

The *gettuvadyam* is used as a secondary instrument along with the *mridangam* in concerts of classical music, though only rarely.

CONCH

The *conch* is the most ancient wind instrument known to man. The *conch* or *sankh* is held very sacred and it is mentioned in all the ancient literature. The *sankh* is one of the attributes of Lord Vishnu.

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The sankh is drilled so that a hole is made at the base in such a manner that the natural whorl is not disturbed. When the sankh is blown, the wind passes through the different whorls and produces a loud, sharp and piercing sound which carries very far and by its very nature attracts attention. The sankh was used as a war trumpet and seems to have accompanied the dhundubhi, bheri and other drums on the battle field. Today it is used in temples, festivals, religious ceremonies and processions.

Sometimes the sankh is elaborately ornamented. It is fitted with a brass mouthpiece at one end while the other end is mounted with an elaborate floral expansion of brass. This type is called the dhavalasankha.

The sankh can produce peculiar rhythmic effects. It is also used as an accompaniment to the nagaswaram in the karaka, a popular rural dance of the South.

AYARKUZHAL

The Ayarkuzhal is literally the shepherd's flute. This instrument is of great antiquity and is used by the shepherds in hilly tracts.

The instrument is a simple bamboo staff of about four feet. In the exact centre of the bamboo, there is a mouthpiece into which a reed made of palm leaf is fixed. On either side there are six holes. The lower of these finger-holes are used for playing. A constant drone is produced from the upper holes. This is achieved by the player's expediency in storing the necessary air in his mouth and blowing continuously through the mouthpiece. The tone of this instrument is soft and sweet.

Kuzhithelam Moharsing

MAGUDI

The magudi is a very ancient wind instrument. The magudi consists of a bottle-shaped gourd into which two pieces of cane reed are inserted and fixed with wax. One of the pipes is pierced with four or five finger-holes which are played upon. The other pipe has only one hole which gives a constant drone. The mouth-hole is fitted with a small reed and air is continuously blown through this. The magudi was used on religious occasions.

Nowadays, the magudi is used by jugglers and snake charmers.

KOMBU

The horn is known as the kombu. It is literally the horn of an animal. It is a long more or less conical tube ending in a large bell and having funnel-shaped mouth piece. In ancient days, the kombu was used by the people to call assemblies, to give signals and to play in their ceremonial dances and festivals. Later on, brass horns came into use and today several varieties of horns are used in temple services, processions, marriages etc.

A hoarse tone is produced by a horn and is not capable of many notes. There are different types of horns in use. They are called by a variety of names such as straight, curved, S-shaped, serpentine.

The ekkalam is a straight trumpet of brass or copper consisting of four tubes which fit into one another. It is commonly used in temple processions.

The tiruchinnam consists of a pair of brass trumpets each about two and a half feet in length. The

Damaru

two trumpets are held in the mouth and blown simultaneously. It is used in temple services.

NAGARA

The nagara is one of the oldest percussion instruments in existence. Other varieties of this instrument, known as bheri and dundubhi, occupied a place of great honour and were used in battle. The battle drum was regarded with great veneration and the capture of this drum meant the defeat of the army.

The nagara is a big conical drum covered with hide. It is used mostly in temples and religious institutions. It is taken out at the heads of processions of temple dieties and also in religious worship.

The shell of the nagara is of riveted copper, brass or sheet iron. The diameter of the head is between two and a half and three feet. The hide is strained upon hoops of metal and stretched by means of leather thongs or thick ropes passing round the underside of the shell.

The nagara is beaten with sticks and the sound produced is deep and imposing.

SUDDHA MADDALAM

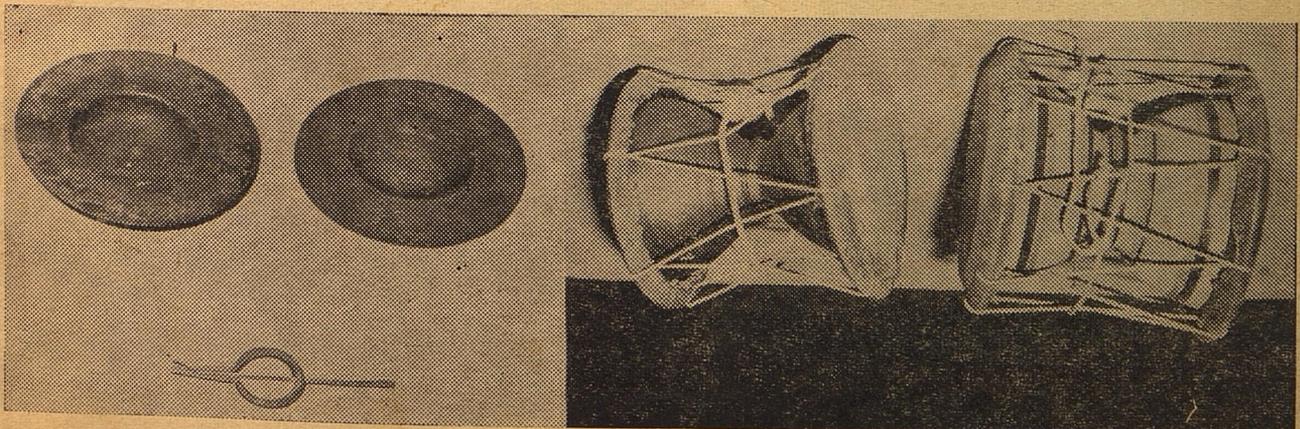
The suddha maddalam is based on the same principle as the ordinary mridangam. On the right head the black paste occupies more space and is much thicker than in the mridangam. The tone of this drum is loud and carries far.

The suddha maddalam is played during rituals in some of the temples notably at the temple at Tiruvarur.

URUMI

The urumi is a double-sided drum which is narrow at the centre and broadens towards the ends.

Udukku



It is played with a curved stick about one and a half feet long and is held in the left hand. The stick is not used to strike the head but moved up and down against the skin surface. The urumi is used only for funeral processions.

PAMBAI

The pambai consists of two cylindrical drums each about one foot in length. They are placed one over the other and tied together. The upper one is made of brass and the lower one of wood. The sides are covered with skin. The right side of the upper drum is played with a curved stick and the left side of the lower drum with the hand.

This interesting instrument is used largely as accompaniment to folk dramas and ballads. A fascinating rhythmical sound can be produced by a skilful player.

KIRIKATTI

The Kirikatti, kirnikatti, kidikatti or kidikattu consists of two conical drums about one foot in height and nine inches in diameter. These drums are joined together and played with curved cane sticks covered with leather or cloth. A muffled sound is produced by one drum while the other gives a clear, bright tone.

The instrument is used mainly to accompany nagaswaram recitals and rural dances. In some temples it is used for special occasions and festivals as in Tiruvarur temple.

DAMARU

The damaru is a small drum, shaped like an hour glass. It is an attribute of Lord Shiva who is said to have played it during the cosmic dance.

Nagara

The length of the damaru varies from six inches to one foot. A small ball of metal or cork is attached to a string which is wound round the narrow waist of the drum over the braces connecting the two heads. The heads are covered with parchment.

The instrument is rolled from side to side. As the drum shakes, the end of the string bearing the metal ball strikes the centre of both the heads alternately and produces rhythmical strokes. By squeezing and releasing the fingers, the braces on the drum can be tightened or loosened. This produces notes of different pitches.

There are longer varieties, of the damaru which are provided with two knotted strings, one near each face. Rhythmical strokes of very fast tempo can be produced by this arrangement.

The damaru is used for accompanying devotional and ritualistic folk music. It is also associated with magic shows, spells and other primitive rites of the common people.

UDDUKU

The udduku or uddukai is a small drum, about one foot in length, with a narrow waist in the middle. A thin membrane covers both the sides and laced with cotton twine. Passing over the twine, in the centre, is a thick tape. When the tape is squeezed it tightens the braces resulting in the sharpening of the tone.

The instrument is made of brass, wood or clay. It is held in the left hand and played upon by the fingers of the right hand.

The street signers use it as an accompaniment for the ballads they sing. Fortune tellers also use it, when they invoke their favourite dieties to drive away evil spirits. It is also used in the temples of village dieties.

TAPPU

An important and popular family of drums used by the common people is called Tappu. It is very simple in construction. It consists of an open circular frame, covered with skin on one side. It can be played either with the hand or with sticks. The diameter varies from three inches to three feet. These drums are commonly used for accompanying the music, devotional songs and dance of the common folk. It is also used on festival occasions. It is also called the tambattam.

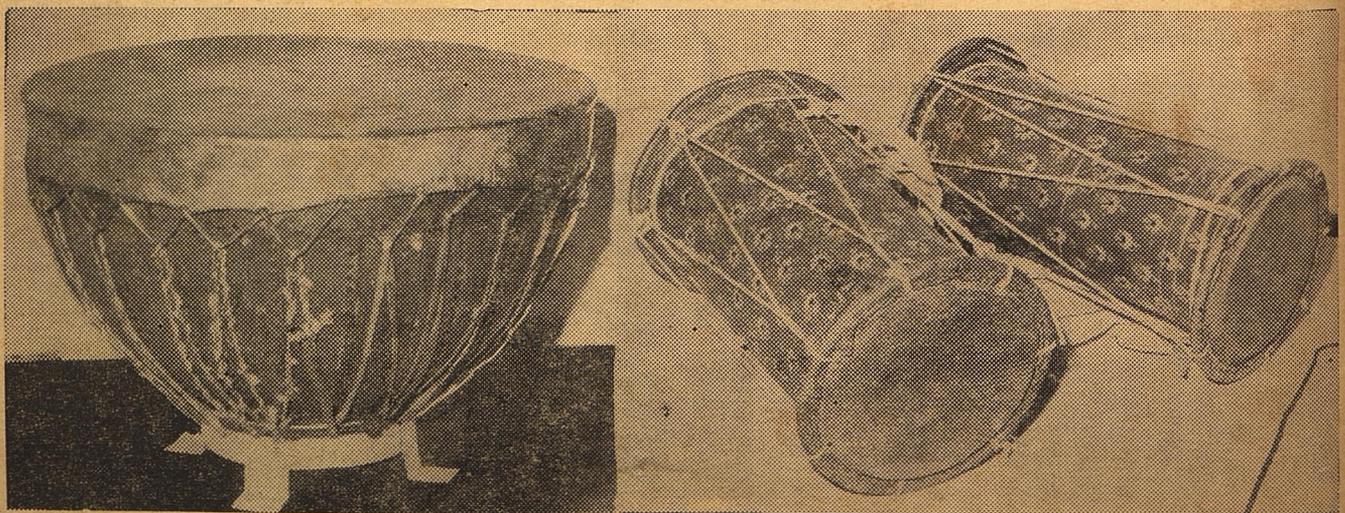
JALARA

The jalara is a pair of small metallic cymbals used for rhythmic purposes. They are flat circular discs, usually connected by a cord or cotton thread passing through a hole in their centres. The jalara produces a pleasant sound and mostly used as an accompaniment to devotional music. Experts are able to produce attractive rhythmic variations with this tiny instrument.

The talam or kuzhitalam is a pair of basin-shaped cymbals, the tinkling of which goes very pleasingly with any soft music in dance, drama or devotional songs. The talam is heavier than the jalara. Generally only the edges of the talam are struck. The two cymbals are not connected by any chord. At the back of each symbol is a tassel of silk or piece of wood which serves as a handle.

R.L.B.

Pambai



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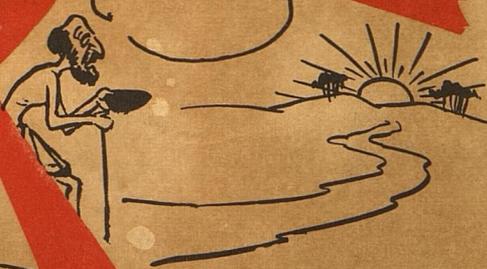


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Slum Clearance



Despite these achievements
Rising Population Raises Problems

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