

Combined water
supply scheme
environmental
sciences essay



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Water scarcity emerged as an important challenge for Tamil Nadu in future. Global discourse suggests that Tamil Nadu can respond to the water scarcity by adopting integrated water resources management. It is a package of best practices for improved water resources management with strong-emphasis on demand-side management. The total water potential of Tamil Nadu is about 46540 million m³ (MCM). However, the per capita water availability is less than 500 m³. It is less than the figure of 1000 m³ which is considered to signal "water scarcity". Even though the total water potential of the state is about 46540 million m³ (MCM), water availability per capita is less than 500m³ per capita per year, well below the 1000m³ figure generally considered to signal "water scarcity". Tamil Nadu is a water-scarce state. Although it has 33 river basins, the rivers are short, and carry water seasonally. Tamil Nadu has 33 river basins. However, the rivers are short and seasonal.

Approaches to augment water supply

Rainwater harvesting

Tamil Nadu tried to harvest a major portion of rainfall through dams and other rainwater harvesting structures. The first approach is to attempt to capture a larger proportion of rainfall, by creating large and small dams and rainwater harvesting structures.

Penninsular River Project

It involves linking of Mahanadi, Godavari, Krishna and Cauvery rivers by canals and construction of storage dams along the rivers. The surplus water from Mahanadi and Godavari will be transferred to South India. Over the

years, Indian planners and crisis managers have talked about a Peninsular river project. One part of the southern development project would consist of linking the Maha nadi, Godavari, Krishna, and Cauvery rivers by canals. Extra water storage dams would be built along these rivers, to fer surplus water from the Mahanadi and Godavari rivers to the south of India

Desalination

There are three different desalination technologies available : reverse osmosis (RO), multi-stage flash (MSF) and multi-effective distillation (MED). In 2004, of 385 water ' blocks' in the state, 138 were identified as being over-exploited, 37 were at critical levels, 105 were semi-critical and 8 were saline. Only 97 blocks were identified as safe.

Combined Water Supply Scheme

Combined water supply scheme is implemented in coastal, quality affected and needy areas. It combines more than one local body. The water is supplied from common source such as rivers, dams and reservoirs. In 2012, Tamil Nadu has 525 Combined Water Supply Scheme. It covers 5 corporations, 58 municipalities, 290 town panchayats, 27, 342 rural habitations and 422 Industries or Institutions. It benefits a population of 2. 71 crore.

Water Resources

The total water potential of Tamil Nadu including surface water and ground water is assessed as 46, 540 MCM (1643 TMC).

Rainfall

The average annual rainfall of Tamil Nadu is 977 mm. It receives relatively more rainfall of about 48% during North East Monsoon (NEM) season and 33% from South West Monsoon. The coastal regions receive about 60% of rainfall through NEM, whereas the interior regions receive 40-50% of total rainfall during this season. The total rainfall is around 32909 MCM.

Surface water resources

The surface water resources comprise of rivers, lakes, tanks, canals, ponds and reservoirs. It accounts for about half of the total water potential of Tamil Nadu. About 90 per cent surface water used for irrigation.

Rivers

There are 34 rivers in Tamil Nadu and they are grouped into 17 river basins and 124 sub-basins. The rivers are short and carry water seasonally. Cauvery is the only major river basin (with drainage area > 20000 sq. km) and there are 13 medium basins and 3 minor basins. The total surface water potential of river basins is 24160 MCM (853 TMC ft). It includes the contribution of 7391 MCM (261 TMC ft) from neighbouring states viz. Kerala, Karnataka and Andhra Pradesh

Tanks

There are 39202 tanks in Tamil Nadu with varying size and types. Many of the tanks are built in 18th and 19th centuries by kings, zamindars and British rulers. They are important source of irrigation and irrigates around 17% of the net irrigated area. Tank is also used for many non-agricultural uses such as drinking water for humans and animals, bathing and washing. It is an

important water harvesting mechanism and also recharges the ground water.

Reservoirs

There are 84 dams with total capacity of 238. 58 TMC ft.

Ground water resources

The utilizable ground water recharge is 22, 423 MCM. Hard rocks occupy 73% of the total geographical area. Sedimentary rocks and alluvial formations occupy the rest of the area. The groundwater is extracted from the rocks and acquires by bore wells, dug wells and tube wells. Irrigated Agriculture Modernization and Water-bodies Restoration and Management (IAMWARM) project aims to restore the water bodies and to provide more income per drop of water. The UN World Water Development report 2006 states that "(The) water crisis is largely our own making. It has resulted not from the natural limitations of the water supply or lack of financing and appropriate technologies, even though these are important factors, but rather from profound failures in water governance. Consequently, resolving the challenges in this area must be a key priority if we are to achieve sustainable water resources development and management." Water Demand Scenario in 2050 The Water Resources Organization of Tamil Nadu estimated that the water demand in 2050 as 57, 725 MCM. The demand for agriculture is projected as 49, 978 MCM and non-agricultural demand is 7, 747 MCM. In 2050, the total water potential of Tamil Nadu including the potential interbasin transfer will be around 46, 540 million cubic meters. The demand-supply gap is projected as 11, 185 MCM. The gap is likely to increase if the inter basin transfer is not implemented and the also on rainfall variability.

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Sectoral demand scenario With increase in population and urbanization the domestic use likely to go up from 4 per cent to 6 per cent. Due to progressive urbanization, the demand of agriculture will remain stagnant or even decrease. The absolute share of industry may not change much, but in absolute terms the increase will be about 27.7 per cent.

Domestic Sector

The domestic sector demand is projected to increase by 50 per cent from 2222 MCM in 2001 to 3460 MCM in 2050.

Sectoral Demand

Irrigation

About 54 per cent (34 lakh hectares) of arable land is irrigated. The gross irrigation intensity is 30 lakh hectares and the irrigation intensity is 120 per cent. S. No Source of Irrigation Percentage of Net Irrigated Area 1 Canals 29.02 Tanks 17.03 Wells 54.0 In recent years, the area under well irrigation is increasing fast and the commanding area under tanks is declining. The area under canal irrigation is about 8.5 lakh hectares. The efficiency of the system declines due to seepage and silting. The area under tank irrigation is 6.3 lakh hectares. It is decreased by a third from 9 lakh hectare in sixties.

Well Irrigation

Wells account for about half of the net irrigated area. There are about 16.79 lakh wells in 1999-2000 and 91.9 per cent of open and dry wells are energized. The contribution of dug wells is declining, whereas the dependence on tube wells for groundwater irrigation is increasing. The contribution of tube wells in 1991 is only 2 per cent. It increased to 23 per

cent in 2005. The depth of the wells varies from 6 to 30 m, whereas the depth of bore wells varies from 30 to 200 m.

Domestic Sector

Industries

Thermal power plants use highest proportion of water in the industrial sector. Other industries which use water in Tamil Nadu are chemicals, distilleries, oil refinery, textile dyeing, steel, fertilisers, pharmaceuticals, petrochemicals, paper and pulp, sugar, electroplating etc. Demand Management

Irrigation

Irrigation efficiency can be improved through command area development, participatory irrigation management, conjunctive use of surface water and groundwater, introduction of advanced methods of irrigation such as drip and sprinkler systems, and reduction in the wastage of water due to over irrigation²

Industrial Sector

The Industrial Policy of Tamil Nadu, 2011 aims to reduce the dependence of industries and industrial parks on surface and ground water resources. To meet the demand of industrial water, it plans to set up projects for recycling municipal sewage into water for industrial use. Supply Side ManagementThe surface water is fully harnessed by holding water in reservoirs and tanks.

Ground water

The dependence on ground water is increased in the recent years. Key IssuesTamil Nadu is a water-scarce state. It has limited potential for further

exploitation. About 75 per cent of the water is used for irrigation. The present irrigation system results in significant waste.

Ground water exploitation

Tamil Nadu is critically affected because of over exploitation of groundwater. According to Central Ground Water Board, out of 385 water blocks in Tamil Nadu, 142 blocks were identified as being over-exploited, 33 were at critical level and 57 as semi-critical. The water blocks in the western part of the state were worst affected. The coastal blocks faced the problem of sea water intrusion. The sea water intrusion is irreversible and degrades the quality of ground water with high concentration of TDS and chlorides. The over exploitation led to declining groundwater levels and renders the existing wells out of use.

Siltation of reservoirs

Siltation reduces the capacity of tanks and reservoirs. In Tamil Nadu, loss of capacity due to siltation is more than 50 per cent in two reservoirs (Kundha and Glenmorgan) and more than 30 per cent in eight reservoirs.

Ground water pollution

Pollution, fluoride and heavy metal contamination affects the quality of groundwater. Effluents from leather industry and textile industry affected the ground water in Palar and Noyal river basin respectively. The nitrate from excess use of fertilizers and pesticides affected ground water quality in certain pockets.

Surface water pollution

The industrial effluents, sewage and sludge from municipalities are discharged into rivers through nallahs and open drains. It has become a serious problem in many river basins such as Tamiraparani, Noyyal, Palar, Caurery, Amaravathy and Bhavani.

Tank Degradation

Diffusion of energized wells reduced the dependence of farmers on tanks and the consequent maintenance such as cleaning supply channels, field channels and strengthening tank bunds. Encroachment of foreshore for cultivation, development of factories, residential areas, infrastructure such as roads and check dams reduced the storage area of tanks. The gradual siltation also reduced the storage capacity. The traditional water managers " Neerkattis" are marginalized. Moreover, the informal tank institutions are deteriorated due to government programs to modernize tank structures such as setting up Water User Associations without considering existing institutions. Neglect of water user associations by Public Works Department after the completion of projects led to deterioration of both formal and information tank institutions in Tamil Nadu. C: UsersADMINDownloadswro-1.jpg

Irrigation efficiency

The water use efficiency in canal irrigated areas is 35-45%, 30-50% in tank irrigated areas and 40-65% in well irrigated areas.

Inter-sectoral water management

Historically, irrigation sector uses 90 per cent of water. With increase in urbanization and industrialization the water requirements of domestic and industrial sector has grown considerably and projected to increase in future. So water for other sectors has to be provided at the expense of irrigation. Further, the effluents from industries and sewage from urban areas pollute the surface and groundwater and reduces the quality fresh water available to agriculture for irrigation. Policy Suggestions

Tank Rehabilitation and Renovation

In Tamil Nadu, the maximum surface water potential is already exploited through medium and small schemes. Additional rain water can be harnessed through revival of traditional water bodies like tanks and ponds.

Rehabilitation and renovation costs much less than construction of new tank.

Tanks has to be partially desilted through modernization programme.

Appropriate modernization strategies has to be selected according to the physical conditions. The water use associations has to be strengthened. The

existing and defunct tanks has to be enumerated and codified using

scientific methods such as high-resolution satellite imagery and aerial

photography. The minor irrigation tanks has to be rehabilitated under

MGNREGA or other schemes. Long term financial provision has to be made

for tank restoration programmes. The Water User Associations/Tank Farmers

should be given all the rights including the fishery rights on a specific shared basis with local panchayats. They should also be entrusted with the

maintenance of the tanks through the income from tanks.

Irrigation Management

Formation of farm ponds has to be encouraged through bank loans.

Watershed development

Watershed development activities have to be intensified especially in overexploited and critical areas. The guidelines for post-project management of watersheds need to be developed for better management of watersheds.

The watershed development activities in the catchment area of ponds and tanks has to go hand in hand with the rehabilitation and renovation of tanks to improve the performance efficiency of tanks.

Recycling and reuse of water

The water availability is much less than the projected demand. So there is an urgent need to recycle and reuse of water. One of the options which is widely discussed is the use of industrial effluents for irrigation. The domestic sewage water can be used for industrial use after proper treatment. Policy Interventions

Groundwater management

Tamil Nadu government directed that no schemes should be formulated in over-exploited and critical blocks.

The Tamil Nadu Farmers Management of Irrigation Systems Act, 2000

This act empowers the farmer's organization by involving them in management and maintenance of the irrigation system through fair and equitable distribution of water among its users. It inculcates a sense of ownership and promote efficient use of water for irrigation

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Vision 2023 for Irrigation Sector

The Vision 2023 document of Government of Tamil Nadu assures irrigation for all. It estimates that an investment of Rs 16, 000 crore would be necessary for linking dams and canals for irrigation and to rehabilitate the water bodies. It aims to increase the irrigated area, strengthen the irrigation infrastructure and conserve the water resources. A special Task Force Committee is constituted to recommend new initiatives to implement the Vision 2023 for irrigation sector.

Dam desilting Project

Priority is given to improve the storage capacity of existing dams. This project aims to desilt the dams and restore the lost storage capacity.

Restoration of Vaigai and Amaravathy reservoirs is taken up on pilot basis.

Formation of new reservoirs

To store the water received from Krishna Water Supply canal new reservoir is formed in Kannankottai and Thervaikandigai villages in Gummidipoondi Taluk of Tiruvallur District.

Augmenting the storage capacity of tanks

To augment the Chennai City Water supply, additional storage capacity of about 568 MC ft is created in in Cholavaram, Porur, Nemam and Ayanambakkam Tanks.

Climate Adoption Programme in Cauvery Delta

This scheme is implemented with assistance from Asian Development Bank. It proposes to construct additional regulators, reconstruct and rehabilitate

the tail end regulators. It is expected to facilitate the effective use of flood waters and prevent the ingress of sea water.

Interlinking of river within the state

It is given priority to effectively utilize the available water resources and to fulfil the irrigation and drinking water requirements of drought prone areas.

The river links identified are: Pennaiyar (Sathanur Dam) - Palar Link, Pennaiyar (Nedungal Anicut) - Palar Link, Cauvery - Vaigai - Gundar Link, and Cauvery (Mettur Dam) - Sarabanga Link.

Tanks Rehabilitation and Modernization

The tanks are rehabilitated and modernized through various schemes such as TNIAMWARM project, Restoration of Traditional Water Bodies Scheme, and Repair, Renovation and Restoration (RRR) of water bodies with domestic support scheme.

Efficient Irrigation Management in Cauvery Delta

A preliminary project report on "Improvements and Rehabilitation of Irrigation Systems in Cauvery Basin for Efficient Irrigation Water Management" is under consideration of Central Water Commission.

Tamil Nadu Irrigated Agriculture Modernisation and Water-Bodies Restoration and Management Project (TN IAMWARM)

It aims to improve the service delivery of irrigation system and to increase the productivity of irrigated agriculture. It propose to achieve it through integrated water resources management in sub-basin framework.

Artificial Recharge Scheme

It aims to restore the depleted aquifers by effectively utilizing surplus water flood flows through construction of check dams, percolation ponds and recharge shafts.

Tamil Nadu Groundwater (Development and Management) Act, 2003

The act provides for a Groundwater Development Authority. It has power to notify areas Institutional arrangements

Water Resources Control and Review Council

It is the apex institution in the state at the policy level. It is chaired by the Chief Minister.

Water Resources Organization

It is charged with the implementation of the State Water Policy.

State water Resources Management Agency (SWaRMA)

It was established in 2011 as a focal-agency for environmentally and socially sustainable inter-sectoral water management.

Institute of Water Studies

It is the nodal agency to plan, assess and manage water resources of Tamil Nadu in scientific manner.

Irrigation Management Training Institute

It imparts training to farmers and officials.

Tamil Nadu Water Supply and Drainage Board

It implements the drinking water schemes in both rural and urban sector except Chennai Metropolitan area.

Chennai Metro Water Supply and Sewerage Board (CMWSSB)

This board promotes the planned development, efficient operation and regulation of the water supply and sewerage services in Chennai Metropolitan Area.