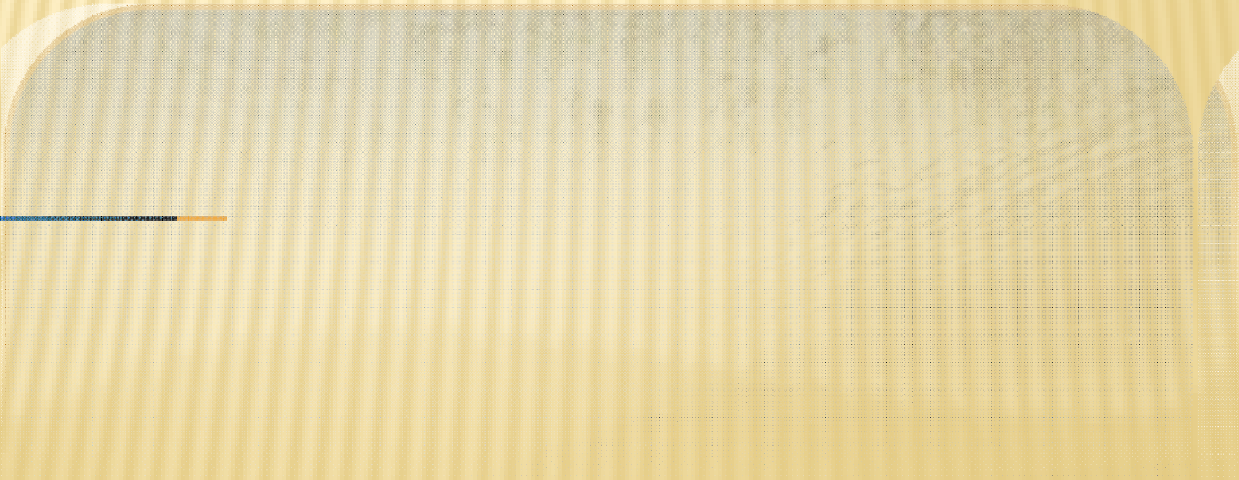


CHAPTER III

MANAGEMENT OF WATER BODIES

Porur Lake



CHAPTER III

MANAGEMENT OF WATER BODIES

Management of water bodies is vital for providing quality water for human consumption, along with their important role as flood accommodators by restricting rainwater discharge into sea. Such management includes creation of water storage facilities, maintenance of the length and width of water bodies and keeping water courses free from encroachment and disuse. Neglect of tanks, canals and illegal encroachments played havoc in the management of water bodies, leading to vast amounts of rain water draining into the sea. National Water Policy, 2002 envisaged that water is a scarce and precious national resource to be planned, developed, conserved and managed in an integrated and environmentally sound basis, keeping in view the socio-economic aspects.

3.1 Deficiencies in increase in storage capacity of water bodies

State Water Policy, 1994 envisaged creation of additional storage facilities, restoration of rivers, preservation of existing water bodies and eviction of encroachments as crucial components for flood control. Standard on Operation of Reservoirs (IS 7323:1994), issued by Bureau of Indian Standards, envisaged construction and/or augmentation of water storage facilities of Reservoirs as one of the measures to control floods.

A study conducted (2008-12), with the approval of GoTN, by the Institute of Remote Sensing, Anna University, Chennai, on 'Flood Risk Mapping of Chennai and its suburbs', also recommended for creation of additional storage facilities to moderate floods.

Deficiencies noticed in augmenting storage capacity of reservoirs and preservation of existing water bodies are discussed in succeeding paragraphs:

3.1.1 Failure to create storage capacity of reservoir

Considering the catastrophic floods, in 1976, GoTN constituted (1979) Nucleus Cell in CMDA to suggest flood mitigation measures. The Nucleus Cell recommended (1980) creation of two new reservoirs in the upstream of Chembarambakkam Tank, influencing Adyar River, to capture 1.57 Thousand Million Cubic feet (TMC) of water. We noticed that after a delay of eight years, WRD proposed (1987) for creation of a reservoir at Thiruneermalai across Adyar River by which time, the said site had become populated due to which the requisite land was not available. Thus, the WRD failed to construct the reservoir which could have accommodated the surplus water in Adyar River in 2015. The WRD had not made any efforts for construction of a second reservoir.

Instead of creating new reservoirs in the upstream of Chembarambakkam Tank, GoTN envisaged (2011-12) creation of three new tanks in the

upstream/downstream of Poondi reservoir, across Kosasthalayar River to augment storage capacity by 4.2 TMC as given in **Table 3.1**.

Table 3.1: Projects proposed for increase of storage capacity

Projects approved	Additional storage capacity in TMC			Expenditure (₹ in crore)	Remarks
	Targeted as per Policy Note	Targeted as per GO	Created upto December 2016		
New reservoir at Thervaikandigai	1.0	1.0	Nil	186.47	Work not completed. Reasons discussed in Paragraph 3.1.2 below
New reservoir at Thirukandalam	1.0	0.26	Nil	28.65	Work completed, but structure breached as detailed in Paragraph 3.1.3 below.
New reservoir at Ramanjeri	1.0	Nil	Nil	Nil	Project was dropped by GoTN.
Deepening of Cholavaram Tank	0.3	0.2	Nil	74.51	Work completed. But full capacity not utilised as detailed in Paragraph 3.1.4(A).
Restoration of six existing tanks*	0.9	0.368	0.17		Failures are brought out in Paragraph 3.1.4(B).
Total	4.20	1.828	0.17	289.63	

* Nemam, Porur, Ayanambakkam, Ambattur, Korattur and Madhavaram

(Source: Policy Note of GoTN for the year 2011-12)

We observed that, against an outlay of ₹ 500.36 crore to increase the storage capacity by 1.83 TMC, an expenditure of ₹ 289.63 crore was incurred upto the end of March 2016 to achieve an increase of only 0.17 TMC. These projects initiated during 2011-12 and scheduled to be completed in 2014-15, with the objective of augmenting drinking water supply and flood control had not been achieved due to various reasons, as discussed in **Paragraphs 3.1.2 to 3.1.4** below.

Recommendation No. 10: We recommend Government to create new reservoir in the upstream of Chembarambakkam Tank as recommended by Nucleus Cell and ensure early execution of the sanctioned works on augmentation of reservoir capacity.

3.1.2 Commencement of work before acquisition of land leading to non-completion of reservoir

Para 180 of Tamil Nadu Public Works Department Code stipulates that no work should be started unless the required land has been duly handed over by the responsible civil officer.

Engineer-in-Chief, WRD, submitted (December 2011) proposals based on WRD's tentative design for formation of new reservoir at Thervaikandigai village (including Kannankottai village) at Tiruvallur District. GoTN accorded (January 2012) Administrative Sanction for ₹ 330 crore (including ₹ 160 crore for land acquisition). The reservoir was intended to store one TMC of surplus water per year from Krishna Water Supply Project, besides harnessing water from its own catchment area. The CE, WRD, Chennai

Region, accorded Technical Sanction in August 2012. The work of formation of reservoir involved connecting the two¹ tanks besides acquisition of land. The land requirement was assessed (May and June 2013) after field investigation as 601.28 hectare² which was approved by GoTN in January 2014.

Pending acquisition of land, CE, WRD finalised (July 2013) the tender for ₹ 149.11 crore and awarded (September 2013) the work to the lowest bidder for completion within 24 months from the date of handing over the site. The work was commenced in September 2013.

The department completed (October 2016) acquisition of private lands to an extent of 324.15 hectare out of 601.28 hectare. However, 130.72 hectare of the acquired private land could not be physically taken over due to pendency in determination of quantum of compensation. As of December 2016, the department had spent an amount of ₹ 90.67 crore towards land acquisition (₹ 54.35 crore paid as interim compensation and ₹ 36.32 crore kept in civil deposits). Therefore, though the poramboke lands and forest lands were taken over, the work could not be completed by WRD despite spending an amount of ₹ 95.80 crore on civil works due to not getting possession of private lands. The total expenditure incurred till March 2016 was ₹ 186.47 crore.

Thus, the failure on the part of the GoTN to acquire unencumbered land and the hasty action on the part of the CE to commence the work without ensuring possession of the entire extent of land required for the work, resulted in non-achievement of the objective of increasing the storage capacity of reservoir for which the responsibility may be fixed.

3.1.3 Imprudent decision and faulty design leading to breach of a check dam

GoTN envisaged (2011-12) construction of a storage reservoir at Thirukandalam in Tiruvallur District, across Kosasthalayar River to store one TMC of water. The proposed reservoir was to be located at the downstream of Poondi reservoir and Thamarapakkam anicut³. As the proposal required acquisition of private land of 1,376.52 hectare in 15 villages, GoTN instructed WRD to revise the project with minimum land acquisition. Accordingly, WRD downsized the project to construct a check dam to store 0.26 TMC instead of the original proposal of constructing a reservoir with a storage capacity of one TMC. We observed that WRD had resorted to construction of check dam instead of a reservoir, in order to avoid land acquisition. GoTN accorded (October 2012) Administrative Approval for construction of check dam for a length of 470 metres at a cost of ₹ 35 crore. CE, Chennai Region, WRD conducted detailed investigation (December 2012) of the site and considering the width of the river at Thirukandalam reduced the length of the check dam (March 2013) to 175 metres, with further reduction in storage

¹ Kannankottai Hissa Rajaneri and Thervaikandigai

² Patta land 324.15 hectare; poramboke land 255.03 hectare and Reserve forest land 22.10 hectare

³ A small concrete structure in the stream to store water

capacity to 0.16 TMC. Accordingly, Technical Sanction was accorded (March 2013) by the CE, restricting the cost to ₹ 32.90 crore. The Technical Sanction envisaged designing the check dam considering the maximum flood discharge of the two upstream reservoirs, viz., Poondi reservoir and Thamaraipakkam anicut.

We further noticed that the structure was designed to withstand a maximum flood discharge of 65,000 cusec⁴, considering 59,725 cusec registered during 1966 floods at Thamaraipakkam check dam. We, however, observed that the WRD had failed to take into account the discharge of 92,260 cusec registered at Poondi reservoir in 1966.

The work was awarded (July 2013) to a contractor for ₹ 28.19 crore for completion in 18 months. The work, commenced in July 2013, was completed in September 2014 at a cost of ₹ 28.65 crore.

Scrutiny of the records revealed that during the floods in 2015, the left side retaining wall of the check dam breached due to inflow of 79,564 cusec; left side of main structure distorted and body wall for a length of 38 metres of the check dam had sunk. WRD proposed (March 2017) to reconstruct the damaged check dam with revised design to accommodate maximum discharge capacity of 90,000 cusec at an estimated cost of ₹ nine crore.

Thus, we observed as under:

- Though WRD had submitted a proposal for construction of one TMC reservoir keeping in view the water potential, to prevent flooding, harness excess flood water and cater to drinking water needs, yet the GoTN advised the WRD to construct check dam by reducing the storage capacity to 0.16 TMC with minimum land acquisition to avoid acquisition of private land of 1,376.52 hectare in 15 villages for construction of reservoir.
- The imprudent decision of the GoTN to reduce the storage capacity to 0.16 TMC just to avoid land acquisition, which was indicative of abdication of its responsibility, which resulted in failure to harness excess flood water to cater to the future requirements as envisaged by WRD.
- Incorrect adoption of flood discharge capacity for construction of the check dam resulted in its breach during 2015 floods thereby causing inundation of nearby areas.

Recommendation No. 11: We recommend the GoTN to institute investigation into the faulty design of check dam for fixing responsibility and ensure completion of reconstruction work without delays.

⁴ Cubic feet per second

3.1.4 Increase in capacity of existing tanks

(A) Cholvaram Tank

GoTN accorded (September 2010) Administrative Sanction for strengthening of Cholvaram Tank and Chief Engineer, WRD Chennai Region, accorded (June 2012) Technical Sanction for ₹ 7.96 crore. The work was awarded (April 2013) to a contractor and completed (July 2015) at a cost of ₹ 7.58 crore.

We noticed that despite execution of works of strengthening the tank and increasing the capacity to store 1.08 TMC, WRD failed to maintain water to the increased capacity of the tank. Reasons for not maintaining water to its increased capacity were not available on record. The highest storage reached was only 0.91 TMC for 12 hours on 3 December 2015 and the average storage was only 0.73 TMC during December 2015 as against the available increased capacity to store 1.08 TMC of water.

We further observed that well before the tank could reach its full capacity, WRD released 400 cusec of water during December 2015 to the already overflowing Redhills Tank which resulted in inundation of residential areas in the downstream, viz., Balaji Nagar, Thiruneelakanda Nagar, Baba Nagar, Burma Nagar and Manali.

Thus, failure of the CE, WRD to ensure full utilisation of the increased storage capacity of the tank and consequent discharge of flood water prematurely had contributed to inundation of residential areas in the December 2015 floods. We observed that the expenditure of ₹ 8.01 crore incurred on increasing the storage capacity of Cholvaram Tank remained largely unfruitful.

On being asked, Government replied (March 2017) that the objective was achieved as the capacity of the tank was increased to 1.08 TMC. The reply was not relevant as the increased capacity to store water upto 1.08 TMC was not fully utilised. Moreover, 400 cusec of water was released without utilising the available increased capacity to store water upto 1.08 TMC. We observed that increasing the capacity was of no use as the increased storage capacity was not utilised despite specifically spending an amount of ₹ 8.01 crore.

(B) Nemam, Porur and Ayanambakkam Tanks

Nemam Tank (capacity of 0.257 TMC) in the upstream of Chembambakkam Tank and Porur Tank (capacity 0.046 TMC) in its downstream influence the flow in the Adyar River. Ayanambakkam Tank (capacity 0.290 TMC) influence the flow in Cooum River.

WRD proposed (August and October 2011) to renovate these three tanks by desilting, deepening through excavation of earth, and by rehabilitation of the bund. It was also proposed to construct a new surplus water regulatory arrangement for Nemam Tank and for restoration of flood carrying capacity of the surplus course.

GoTN accorded (December 2011) Administrative Sanction for renovation of these three tanks at a cost of ₹ 129.50 crore. GoTN also directed WRD to identify the selling option for the earth excavated by following the prescribed procedure for realisation of revenue to Government. CE, Chennai Region, WRD accorded (December 2011) Technical Sanction for these three works at a cost of ₹ 129.50 crore. The work was awarded (December 2012) to three contractors for execution within 18 months from the date of handing over of the site. The sites for the work were handed over in January 2013.

As stipulated by the Tender Approval Committee, the contractors and the Superintending Engineer concerned furnished joint declaration to the effect that they had inspected the site and ensured the accuracy of the quantity of the earth available for excavation. The agreements also stipulated for payment of the departmental rate of ₹ 102.98 crore⁵ for the disposal of the excavated earth by the contractors and no payments need to be made for the earth utilised for strengthening the bunds of the tanks.

The details of the additional capacity envisaged, work proposed and executed have been shown in **Table 3.2**.

Table 3.2: Details of augmentation works in three tanks

Particulars	Nemam	Porur	Ayanam-bakkam
(1)	(2)	(3)	(4)
Existing capacity of the tank (TMC)	0.257	0.046	0.290
Additional capacity envisaged (TMC)	0.320 ⁶	0.024	0.024
Civil Works			
Percentage of civil works completed till March 2016	34	90	96
Value of work done (₹ in crore)	18.52	13.91	24.27
Earth excavation work			
Proposed quantity of earth excavation (in lakh M ³) for bund strengthening and for disposal through sale	3.48 + 114.37 =117.85	2.75 + 12.48 =15.23	2.19 + 1.89 =4.08
Quantity of earth actually excavated (in lakh M ³)	3.31+9.61=12.92	2.73 +1.06 =3.79	2.15+1.0 =3.15
Percentage of excavation of earth completed and utilised for formation of bund	95	99	98
Percentage of excavation completed for sale of earth by contractors	8	8	53
Over all percentage of excavation of earth	11	25	77
Increased capacity achieved with reference to the overall percentage of excavation of earth (in TMC)	0.0216	0.006	0.0185

(Source : WRD)

⁵ Departmental rate realisable as per agreement for Nemam Tank - ₹ 91.49 crore; Porur - ₹ 9.98 crore and Ayanambakkam - ₹ 1.51 crore

⁶ Adding 0.196 TMC by deepening the tank and 0.124 TMC by construction of new regulatory arrangement, which was achieved in full.

As may be seen from the above table,

- Though 128.74 lakh M³ of earth was required to be excavated for sale in the three tanks, only 11.67 lakh M³ (nine *per cent*) was excavated and a revenue of ₹ 11.48 crore⁷ was realised. Thus, the non-excavation of the agreed quantity of earth from the tanks resulted in non-achievement of objective of enhancement of capacity of tanks for harnessing flood water to an extent of 23 to 89 *per cent*. Short achievement of the envisaged objective resulted in discharge of flood waters to the nearby areas causing inundation.
- The works were proposed to augment the storage capacity of the three tanks by 0.368 TMC. But, the actual achievement was only 0.170 TMC (46 *per cent*) despite incurring an expenditure of ₹ 74.04 crore against the estimate of ₹ 129.50 crore for the work.
- In respect of the Nemam Tank with the lowest achievement, only 34 *per cent* of civil works, such as flood wall, regulator, etc., which formed part of the surplus course was completed at a cost of ₹ 6.71 crore due to non-completion of land acquisition. This led to overflow of water over the surplus course and inundation in the nearby areas during December 2015 floods.

Thus, the works proposed to augment the storage capacity of the three tanks in Chennai and its suburban areas by harnessing the rain waters were ill-conceived due to wrong feasibility study for earth excavation, leading to non-achievement of the envisaged objective of increase of storage capacity of water and to take care of flooding in the area despite spending an amount of ₹ 74.04 crore.

Government stated (March 2017) in reply that the civil works in Nemam Tank would be completed after acquisition of land. In respect of non-excavation of earth by contractors for sale, Government replied that the estimation of the quantity of earth in the estimates were arrived on the basis of arithmetical calculations due to presence of water in the tanks and hence the entire quantity could not be excavated.

The reply was misleading as the quantity of earth to be excavated was calculated and certified by both the Contractors and the Superintending Engineer after doing joint survey and confirmed by both of them while signing the agreement of the work. Moreover, no action had been taken against the contractor for leaving the work incomplete in violation of the terms and conditions of the agreement.

⁷ Departmental rate realised for Nemam Tank - ₹ 8.28 crore; Porur Tank - ₹ 2.40 crore and Ayanambakkam Tank - ₹ 0.80 crore

3.2 Non-implementation of project for restoration and protection of lakes

As per Tamil Nadu Protection of Tanks and Eviction of Encroachment Act, 2007, Pallavaram Lake and Kilkattalai Lake in the suburban area of Chennai having a total storage capacity of 0.310 TMC were under the control of WRD, who was responsible for maintenance of these lakes. The Pallavapuram Municipality initiated (June 2014) a proposal to restore and protect the two lakes and GoTN accorded (January 2015) administrative sanction for ₹ 22.02 crore for the said work.

Since the creation and maintenance of lakes falls under the jurisdiction of WRD, the municipality was not competent to take up the work owing to which the EE, WRD objected to the proposal of the municipality and insisted (January 2016) on implementation of the project through WRD as Deposit Work. Due to the dispute between WRD and the local body, the project could not be commenced. Subsequently, the local public took the neglected condition of the lakes to the National Green Tribunal, which intervened and ordered (September 2016) WRD to take up the work. The work was yet to be started (January 2017).

We observed that, the WRD had failed to undertake routine maintenance of these two lakes which had led to abandoning of the lakes, besides non-utilisation of water storage of 0.310 TMC for flood mitigation and cater to drinking water needs. Further scrutiny of records revealed that during the floods in December 2015, the two lakes had breached and flooded the neighbourhood.

The laxity on the part of WRD to execute the work in time calls for fixing of responsibility.

3.3 Incomplete river restoration works

The three east flowing rivers in the CMA viz., Adyar, Cooum and Kosasthalayar are the natural waterways draining into Bay of Bengal. Free flow of flood waters in these rivers is crucial for flood control. Failure to desilt these rivers and encroachment on river banks, which contributed to the floods of 2015 are discussed in the succeeding paragraphs. The lapses on the part of various agencies concerned are discussed below:

3.3.1 Deficiencies in eco-restoration of Adyar River

GoTN established (2006) Adyar Poonga, a special purpose vehicle, for development of eco-park in 23.48 hectare in Adyar River. Adyar Poonga was renamed as Chennai Rivers Restoration Trust (CRRT) in 2010, with an extended mandate to develop, maintain and conserve eco-parks in Chennai and any other places of Tamil Nadu to preserve ecological and natural resources such as waterways and water bodies.

CRRT prepared (2010) a DPR for restoration of 121.46 hectare of Adyar River in Adyar estuary and creek⁸ (**Exhibit 3.1**).

Exhibit 3.1: Project area of eco-restoration of Adyar Creek



(Source: Website of Chennai Rivers Restoration Trust)

GoTN accorded (December 2010) administrative approval for the project at an estimated cost of ₹ 18.93 crore and subsequently, revised (March 2013) it to ₹ 24.93 crore due to change in the scope of work. The restoration works included capital dredging⁹ at the river creek and mouth to manage flood discharge. It was also envisaged that dredging at mouth of river at 400 metres wide and 1.5 metres deep below Mean Sea Level would keep the river mouth open.

Coastal Regulatory Authority, Ministry of Environment and Forests, GoI, while approving the above project, restrained CRRT from dredging the river mouth till all the sewage outfalls identified by Chennai Water Supply and Sewerage Board (CMWSSB) were plugged. CMWSSB proposed (July 2012 and December 2014) to plug all the 49 outfalls in a phased manner with State funds. The works were started in phases in January 2014 and September 2015. As of November 2016, though civil works relating to 31 outfalls were executed by laying sewer lines, the outfalls were not plugged as the sewage source was not yet connected to the newly laid sewer lines. Remaining 18 works were still under progress; 14 of them had overshoot the original target date by 10 months. The expenditure incurred on the project till September 2016 was ₹ 16.06 crore.

Thus, the failure of CMWSSB to connect sewage source to sewer lines, as planned, had resulted in delay in plugging the outfalls. Ultimately, the

⁸ A narrow area of water that flows into the land from the sea, a lake etc.

⁹ Deepening the bed of river by removing accumulated sand

dredging works in the mouth of Adyar River were not started even as of November 2016, defeating the objective of smooth discharge of flood water. Non-opening of Adyar River mouth prevented free flow of water to the sea and the resultant flood in Adyar basin during 2015.

3.3.2 Deficiencies in eco-restoration of Cooum River

During 2000-01, GoI formulated the Chennai City River Conservation Project (CCRCP) with an objective to prevent sewage entering into waterways, augment the treatment capacity of sewage treatment plants (STP) and to keep the city waterways clean on sustainable basis. Under the project, CMWSSB carried out the works relating to laying of interceptor sewerage lines along Cooum River to intercept and divert all untreated sewage entering the river. The scope of the works involved laying of sewage pumping mains and construction of four STPs at a cost of ₹ 382.24 crore during 2001-06. C&AG's Audit Report on GoTN (Civil), 2006, pointed out non-removal of sand bars and failure to carryout measures to keep the river mouth open on sustainable manner. WRD, however, had not taken any measures in that direction.

After a delay of five years, GoTN directed (2011) CRRT to prepare a DPR for restoration of Cooum River. The consultant engaged (2012) by CRRT submitted the DPR in November 2014 and GoTN accorded (January 2015) administrative sanction for implementation of Integrated Cooum River Eco-restoration Project at a cost of ₹ 604.77 crore by various agencies. The objective of the project was to improve and maintain flood carrying capacity by dredging the river mouth and to abate pollution by intercepting sewage outfalls. The project is scheduled to be completed in 2018.

(A) One major component of the project was to improve the river channel through dredging from its mouth to Chetpet bridge. As the work site was in coastal zone, it was mandatory to obtain clearance from Coastal Regulatory Authority. Though the project was approved in January 2015, we noticed that Chennai Rivers Restoration Trust (CRRT) applied for clearance from Coastal Regulatory Authority only in February 2016, after a delay of 13 months, mainly due to administrative delays. CRRT's application (February 2016) for clearance was pending with Coastal Regulatory Authority (December 2016). As per CRRT's DPR, there were 118 sewage outfalls into the river. The study report of Public Affairs Committee, Bengaluru, highlighted that Cooum River was spoilt by filth and pollution and the water quality was considered to be highly toxic. In order to improve the water quality, CMWSSB planned (June 2016) for laying interceptor lines to divert sewage. The work was planned by CMWSSB in 10 packages covering a length of 10.51 km. We noticed abnormal delay in executing these works as discussed hereunder:

- four works were not taken up for want of Coastal Regulation Zone clearance and the issue was under correspondence with Coastal Regulatory Authority,
- two works were not taken up due to lack of response for repeated tender calls,

- two works were not taken up as CRRT declined to release funds as there was no progress in works and CMWSSB required funds to pay mobilisation advance to contractor to commence the work, and
- two other works were not taken up due to delay in eviction of encroachments by Tamil Nadu Slum Clearance Board (TNSCB).

(B) Under the project, TNSCB was responsible for resettlement of 14,257 slum families and 458 vendors enumerated along the banks of Cooum River. GoTN approved (January 2015) an outlay of ₹ 181.85 crore to CRRT for resettling the slum families. CRRT was to release funds to TNSCB based on progress in work. The expenditure included shifting allowance, subsistence allowance, EB service connection charges, community development programme, land cost, etc. TNSCB sought (October 2016) ₹ 181.85 crore from CRRT for eviction of slum dwellers. CRRT, however, did not release any funds to TNSCB till November 2016, citing lack of progress in the preliminary works for resettlement of slum dwellers. This indicated lack of coordination between CRRT and TNSCB on how to go about with eviction.

Thus, due to lack of planning, the project was taken up after delay of five years. Further, the slackness in execution of works on plugging of sewage outfalls and resettlement of slum families, had resulted in slow progress of the project to restore Cooum River. We observed that completion of the project by 2018, as per schedule, would not be possible.

3.4 Analysis

Three rivers and several *nullahs* criss-crossed the city's length and breadth. But, siltation and unplanned construction and encroachments impacted their flood carrying capacities. Projects to restore and increase the storage capacities of the tanks and reservoirs suffered setbacks due to faulty planning and lack of co-ordination between various Government agencies.