MEDIAEVAL PERIOD
(1336 - 1799 A.D.)

The Vijayanagar Empire
(1336 - 1565 A.D.)

An era of gigantic works:

The Vijayanagar Empire marked another big step forward in the history of irrigation in South India including Karnataka in pre-British days. This progress is characterised by the construction of some huge projects. Thus far in the history of South India the biggest projects were the Kaveri delta project and the Sulekere tank. The latter is now known as Shantisagara and is described in Appendix 2. It has a circumference of 40 miles and is probably the biggest of its kind in India if we leave out of account the Bhojpur lake which had a circumference of 360 miles but is no longer in existence. The Vijayanagar emperors built a number of gigantic reservoirs like Madag-Masur, Porumamilla, Kambum and Vyasaamudra - all of which still continue to serve the people. In addition, they built dams across the Tungabhadra and the Kaveri in a number of places in the Bellary, Raichur and Mysore Districts. Some of these dams are ingenious constructions and they are still in working order even after five to six hundred years. Till the very end, i.e., till 1565 A.D., when Vijayanagar was defeated in the battle of Talikota or Rakkasa-tangadi,
the capital and the kingdom were prosperous.

Much of the success of the Vijayanagara rulers in constructing huge reservoirs and dams was due to the enormous resources which this biggest empire in the history of South India commanded. It was further due to the personal interest of its rulers like Bukka I and Krishnadeva Raya and a host of their officers and engineers in carrying them out, so that their subjects may be benefited. As regards the cost of these projects, Nuniz says of Bukka I that his treasury became empty because of the expenditure involved in constructing the Tungabhadra dam (Turuttu anicut) which supplied water to the city of Vijayanagar and the irrigation of the lands round about that city.

In A History of Bijapur by Rafiuddin Shiraji, a contemporary work, it is said "(Ramaraya) completed the work of canal begun by Krishnaraya. The Kingdom became extraordinarily prosperous and happy.... The city was supplied with plenty of water from the river. There were 70 large canals running through the city. Every officer had extensive gardens which produced plenty of fruits of all kinds". There is no doubt that all these projects had the double object of benefiting the common people and at the same time enriching the treasury.

Fourteenth Century

After discussing the rationale of the big projects and reserving the details of their construction to a later chapter, we come to notice a few irrigation projects and treat them chronologically. They were built by the princes, officers and the common people. One of the earliest was
Mangasamudra² built by an officer of Harihara I named Bayanna in Hiriya Gandasi (Hassan district), who named it after his mother. It was provided with a waste-weir and a feeder canal. And as is usual on such occasions, he built a temple for Hanuman ‘for the safety of the channel brought to the old tank’.

The next example is also of the time of Harihara I. It relates to Changanad (Hassan district) which was then governed by Prince Bukkanna Vodeya. A Rudrapatna record (Arkalgud taluk) of 1357 A.D.³ says that Mahavaddavayavahari Mahadevanna got the King’s permission and established an agrahara called Lakshmipura and also a tank. The Rajakaluve or King’s channel from this tank had to pass through a number of villages in Changanadu. The King Harihara ordered prince Bukka to see that both sides of the Rajakaluve or canal were revetted with stones. Bukka’s officer Sovapparasa attended to this revetment. If it had not been done, the houses and the grain storages below the level of the channel in the village would have been affected by the seepage of water. This shows the interest the Government took to protect the welfare of the common man. In 1369 A.D., the Porumamilla reservoir, the most famous Vijayanagara project was constructed. It is described in a later chapter dealing with construction techniques.

A record from Kellengere (Arsikere taluk) of 1367 A.D.⁴ speaks of satisfactory arrangements for the maintenance of a tank. Those who received the grant had to maintain the buffalo-man, tank-cart, oil for grease, crow-bar, pick-axe etc. That such satisfactory arrangements for the maintenance of tanks were not unusual is made clear by the Bolakyathanahalli inscription of 1371 A.D.⁵.

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It registers the grant of land and taxes belonging to Bolakyatanahalli to Bommagauda and others by the *mahajananas* of Hebbale for maintaining four carts for the tank.

According to an inscription from Ramasagara, Bangarpet taluk, Bukkaraya was responsible for the construction of Bukkasagara, which is now known as Ramasagar. The inscription belongs to the time of Devaraya I, but the tank was constructed in the time of Bukka I. This tank has a long history and it is traced in Appendix 3.

The Kalludi (Gauribidanur taluk) inscription of 1388 A.D. is well known. According to it, when Vira Harihara Raya’s son Sri Pratapa Bukkaraya was in Penugonda city - in order that all the subjects might be in happiness - water being the life of the living beings - Bukkaraya in open court gave an order to the master of ten sciences, the hydraulic engineer (*Jalasutra*) Singayya Bhatta that he must bring the Henne (Pennai) river to Penugonda. Accordingly Singayya Bhatta conducted a channel to the Siruvvara tank and gave the channel the name Pratapa Bukka Raya Mandalada Kaluve. Singayya Bhatta must have had previous experience and must have been well known for his success as an engineer. It is very likely that he got this experience when works like Porumamilla reservoir were constructed.

The Aruvanahalli (Maddur taluk) record of 1381 A.D. together with the earlier one of the same place of 1358 A.D., state that Bhattara Bachiyappa excavated tanks like Bukkarayasamudra, Kirtisamudra, Maluveyakere, Nagavvevakere, Bachappanakere and Chavundappanakaluve. He made sluices to the tanks he had constructed. Of these tanks, the first two were in the names of his king and his
father, the next two in the names of his mother and a female relative and one in his own name and another in the name of a male relative. All these were virgin tanks (Kannegere). He also beautified the tanks by planting trees all around them.

The Tirumani inscription of Bagepalli taluk of 1397 A.D.⁹, like the above mentioned Kalludi inscription, shows the interest taken in irrigation by the members of the royal family. According to this record, Bukkaraya’s grand daughter Jommadevi, directed a channel to be made in front of the Tirumani village. The contract was given to masons Pedda Bayira Voja and Pinna Bayira Voja. They dug a channel which filled a tank, for which a sluice also was constructed. The terms of the contract were that if it was successful they should get 130 gadyanas, certain land, a horse and bracelets. If the contract failed, these should be returned. But it did succeed. This old channel still exists and feeds the Tirumani tank which has an ayacut of 201 acres.

Fifteenth Century

While in the fourteenth century, mostly new reservoirs and very big ones were constructed, in the fifteenth century, most of the records deal with renovations of tanks. It is possible that by this century, the scope for new constructions was limited. However, it was in this century that anicuts were constructed on the Kaveri and at Harihar.

The Mirle inscription of 15th century¹⁰ in Krishnarajanagara taluk registers a sale of wet and dry lands to Chikka Dikshita by the mahajans of Hampapura and the farmers of Halli Hiriyur. It states that the first channel
in their village was breached in eight or ten places and as they were unable to effect the necessary repairs, they sold for enabling repairs to the channel being carried out, a house, wet and dry lands. This shows clearly that they were very much concerned with the proper maintenance of the irrigation channel.

In the Harihareshwara temple at Harihara, in Chitradurga district, there are two inscriptions\(^\text{11}\) which give the history of the irrigation project which is unique in some ways. It was a joint undertaking of the temple authorities and the *mahajanäs* of Harihara. The temple authorities contributed the land and apparently two thirds of the expenses. The *mahajanäs* who were about 120 in number contributed one third of the expense. The benefits from the project and the expense of its maintenance were to be shared in the proportion of two thirds for the temple and one third for the *mahajanäs*. The project consisted of building a dam to Haridra river, a tributary of the Tungabhadra river. The dam was constructed just before the tributary joined the Tungabhadra and from the reservoir a canal, about 8 miles long, was constructed and this passed by the villages of Belludi, Hanagavadi, Harihara, Gutturu and Ganganarasi, (even now they have the same names) and thereafter the canal joined the Tungabhadra. The project had the sanction of Devaraya I in 1410 A.D. It was constructed by one Bullappa.

The second inscription at the same place of 1424 A.D records that this dam breached and caused distress to the *mahajanäs* who had lost all their property. Minister Chamaraja came to the rescue of *mahajanäs* and advanced money for the repair which was carried out by Bullappa
who had built it. How long thereafter the project was in order, it is impossible to say. But as long as it was in order, it brought great prosperity to the Harihara region. According to the first inscription in Harihara, the project benefited six villages in that area. Such a channel would have had to cross a number of minor drainages and should have had adequate arrangements to ensure water supply to each village enroute. Since both the dam and the channel are extinct, one has to conclude that silting up of the channel and the dam perhaps resulted in breaches which were not attended to in time.

Operating the sluices was not easy and some times it proved fatal. One Allagaunda while attempting to fix the piston of the sluice fell into the tank and died. A mason by name Buliyroja was then appointed on condition that he would be given in grant wet and dry land and a house. He had also to repair any damage which might occur to the sluice. Thereafter, it became his responsibility to keep the sluice always in good condition and to operate it. This is the substance of the record at Aralalu (Bangalore district) of the reign of Harihara II of 1400 A.D.\textsuperscript{12}.

The builder of the tank was given Dasavanda or Kattukodige or rent-free land. To show that Dasavanda was different at different times and places, the Vaniganahalli (Mulbagal Taluk) inscription of 1407 A.D.\textsuperscript{13} is a good instance. To Mangarasa, the temple priests of goddess Gauri and the citizens gave a sasana (Charter) for rent-free rice-land as Kattukodige or rent-free land for the tank as follows:-

"Whereas you have built the tank in Vaniyarahalli and made the Mangasamudra, of the rice-lands below and
within the tank we grant you two (parts) in ten as a kattukodige and of the two (parts) in ten we grant, one (part) is to be enjoyed free of all taxes for ever”. Here, dasavanda grant which literally means one in ten is said to be two in ten and elsewhere as in Rajagundlahalli to be considered later, it is three in ten.

Nine years later i.e., in 1416 A.D., in the same Mulbagal taluk, the conditions of the grant were different. The Arali dam across the Palar river in Katariyanahalli having been breached from time immemorial and ruined down to the level of the ground, in order to restore the dam so as to form a tank and build a village there, the temple priests of the place gave to certain Brahmins, lands near the dam on following conditions :- “The rice lands, under and in the tank which you construct dividing them into four parts, one part will belong to temple treasury and the remaining three parts we grant you as an agrahara”.

The Triyambakapura (Gundlupet taluk) record of 1417 A.D. has the distinction of containing as many as eighteen tanks in a single place and these were at Hatalakote, Moraga, Arrekothara, Mulur, Arakalavadi, Narasamangala, Hegavadi, Ankhali, Hagula, Kodihalli, Kutanur, Vijayapura, Nalavaru, Raghavapura, Edatale, Kelasur, Vodeyana and Sagadi. In addition to these 18 tanks, there is mention of a canal called Hiriyakaluve or the big canal. The record speaks of rice and betelnut, which were grown with the help of these tanks being gifted for the worship of God Triyambakeshvara. All these tanks must have made the Terkanambisime of the present Gundlupet taluk, one of the richest places in South Karnataka. What this area was
like in the last decade of the 19th century is described by Rice in his Gazetteer\textsuperscript{16} as follows: "In the neighbourhood of Terkanambe are numerous old tanks, disused, but indicating the former importance of the place".

It appears that the Vijayanagara administrators made a systematic effort to restore old tanks and searched for this purpose suitable patrons. While the Arali dam was restored with the help of Brahmins, in Bettahalli, an entrepreneur called Alagisetti was entrusted with the work of restoration. The Krishnapur (Channapatna taluk) inscription of 1438 A.D.\textsuperscript{17} states: "Bettahalli yielding a revenue of 40 varahas having gone to ruin, Chikkaperumaladeva (Government officer) made it over to Alagisetti as sarvamanya (a village free of rent) for establishing a new settlement named Tirumalanathapura. Alagisetti built the pattana or town, a temple and excavated two tanks Arkasamudra and Timmasamudra". This is one of the best examples of entrepreneurship combined with philanthropy.

Most of the dams on the Kaveri and its tributaries were constructed in Vijayanagar times. The earliest was the Madhavamantrikatte or dam in Talakadu traditionally attributed to Madhava Mantri who served under Harihara and Bukka\textsuperscript{17a}. He is also credited with the construction of a tank known as Manchalasamudra named after his mother in a record of 1391 A.D.\textsuperscript{18}. After the Talakad dam, the Sitapur dam near Srirangapattana appears to have been constructed. The Sitapur inscription of 1467 A.D.\textsuperscript{19} states that when Devaraja, son of Singanna Vodeya, had excavated a new channel from the Kaveri, the mahajaninas of Harahu village desired that it should be extended to their village. The donor agreed and dug the channel at
his own cost and received a suitable reward. Though the
inscription does not speak of any construction of a dam,
the diversion of water from the Kaveri could have been
possible only from a dam. Perhaps, the same dam and
canal system were reconstructed by Chikkadevaraja Wodeyar
(1673-1704 A.D.) and are today known as Madada Katte
dam and Chikkadevarayasagar canal.

One of the ways of establishing an *agrahara* or settlement
of *Brahmin* scholars was to assign to them vacant land or
forest land and it became one of their primary functions
or responsibilities to excavate a tank. Sometimes, as in
the following instance, the process is reversed, first a tank
is constructed and then an *agrahara* is established. This
is the story of the Devasamudra *agrahara*. A record from
Heggadadevanakote (Mysore district) of 1493 A.D.\(^{20}\) states
that an officer called Naganayaka spent money and excavated
a tank. Then he got 40 scholars learned in different
branches of learning and made them settle down in Chakenahalli
and he requested the king to make it into an *agrahara*. Both
the tank and the *agrahara* were called Devasamudra after
the king.

The Rajagundalahalli (Mulbagal taluk) record of 1496
A.D.\(^{21}\) gives details regarding the construction of a reservoir
and its sluices and the financial arrangements made for
their maintenance. The former have been made use of in
a later chapter. The latter describes the grant given to
the builder of the tank. It is in three parts as follows :-
(1) 4 parts of the rice grown in the lands formed under
the tank, (2) 3/10 of the land under the tank divided into
best, middling and inferior and (3) one *khanduga* of dry
land to grow *ragi*.
The Sixteenth Century upto Talikota - 1565 A.D.

In the history of Karnataka, the sixteenth century saw the Vijayanagara empire reach the zenith of its glory upto the battle of Talikota or Rakkastangdi in 1565 A.D. After its defeat at the hands of the Shahi powers of the Deccan in this battle, Karnataka was divided between the Adil Shahis in the north and a number of smaller powers like the Keladi Nayakas, the Chitradurga Palegars and the Wodeyars of Mysore in the South. Before 1565 A.D. the construction of dams and reservoirs received utmost encouragement from Krishna Raya. He built them in the names of his parents, queen, prince, priest and religious adviser. The movement was encouraged by his officers and the momentum was kept up in the reigns of his successors Achyutharaya and Ramaraya. We will now give a chronological summary of the construction and restoration of reservoirs of the sixteenth century upto 1565 A.D.

One of the earliest inscriptions 22 of the time of Krishnaraya (1509-1529 A.D.) while granting Chandragutti as an amaram (fief) stipulates that the dredging of the silt from the local tank had to be done every year and the responsibility for this essential task was squarely laid on the gauda, senabova and residents of the village. It is because of the failure to discharge this responsibility by their modern successors, that tanks have gone out of use.

The next record is an inscription of Krishnaraya of 1513 A.D. 23 in the Prasanna-Virupaksha temple in Hampi. In this record, the King makes a gift for the merit of his father Narasa Nayaka and mother Nagaji-amma. The
inscription mentions in Hampi the tanks of Kannikikatte, Bhupatikere and Gaurajikere and Nagalapura channel. In the year 1516 A.D., in the capital, Krishnaraya gave to his priest Ranganatha Dikshita a village (close to his capital) as an *agrahara*. In this village, Nagenahalli, the priest constructed a tank called Nagasamudra and called the *agrahara* Nagaladevipura in the name of Krishnaraya's mother\(^{24}\). Another inscription of the same king of 1518 A.D.\(^{25}\) also in Hampi, mentions Chikkarayakere in Vijayanagara city. Obviously, the tank was constructed in the name of his son Tirumala called here Chikkaraya or crown prince.

An inscription of 1519 A.D. from Melukote\(^{26}\) of Krishnaraya's reign refers to the breach and ruin of Hosakere tank and its channel. One philanthropist, Lakshmipathi Setti, reconstructed its bund and sluice and removed the silt from the channel. The temple authorities in Melukote were so much relieved by this charity that they performed special religious ceremonies in the temple in the name of the donor's father.

Krishnaraya constructed in 1521, the great dam and channel at Korragal and the Basavanna channel both of which are still in use and of great value to the country\(^{26a}\). Krishnaraya was responsible for the construction of Vyasasamudra a very big tank on the borders of Kolar and Kadapa (Cuddapah) districts near Chelur on the Papagni river. A record of 1526 A.D. belonging to Krishnaraya from Bhattakonda (Krishnarajapura)\(^{27}\) refers to the grant of village Bhattakonda (Bettakunda) renamed Krishnarajapuram for the maintenance of the tank Vyasasamudra.
According to Gudihalli (Harapanahalli taluk) inscription of 1527 A.D. in Krishnaraya's reign, one Timmarasa under the orders of his superior Nagarasaya had the damaged sluice of the tank in the village Arasikere rebuilt. The inscription gives full details of the reconstruction. It appears that the sluice was damaged and unworkable due to the use of inferior material in construction. The inscription says that Timmarasa got the sluice opened and its different parts removed and replaced them by strong stones and rebuilt it firmly with mortar.

In the same year and reign, there is a record in Dummi (Chitradurga district) which speaks of a harrowing tale. An officer demanded from the residents exorbitant dues for repairing the breaches caused by the flood to the village tank. The villagers could not pay and therefore they left the village. A new officer, by name Ramanna Nayaka, came and persuaded them to return and gave them a charter to the effect that he would not demand such heavy dues.

There is another similar example of concerted effort on the part of the cultivators of Dondavate village in Bellary district in 1529 A.D. They found that this village was lagging behind for want of irrigational facilities. They approached their local ruler Mudana-Nayaka, who gave land to Malesani who built a tank by spending money from his own pocket. This is a very good example of people taking the initiative in having a tank in their village and the public spirit shown by one citizen.

The Chikkakeriyaginahalli (Kudligi taluk) inscription of 1539 A.D. in the reign of Achyutaraya, records the
construction of the tank Hiriya Lakkasamudra by Bayakara Ramappayya in the name of his mother Hiriya-Lakkarsamma. He also constructed many other tanks. He built the tank Achyutaṃma-samudra and beautified it by planting trees all round it. The other tanks that he built were Bachasamudra, Ramasamudra, Akkasamudra, Kamasamudra, Ammasamudra, Virasamudra, Achyuteendrasamudra, Venkatendrasamudra, Pina-Lakkasamudra, Chinna-Tippasamudra, Pedda-Lakkasamudra, Lingalayatataka, Venkatayyatataka, Peda-Timmasamudra and Chinna-Bachasamudra. On the whole, he constructed sixteen tanks. Thus, in the history of tank irrigation in Karnataka, he stands foremost for having built the largest number of tanks. Another noteworthy feature about his work is that these tanks were named after the members of the ruling family or members of his own family. A still further remarkable feature of his work is that he beautified the tanks that he built by laying out gardens in their surroundings.

The inscription at Honarabalu in Chamarajanagara taluk (1540 A.D,) registers the renovation of a tank and states that this was undertaken at a time when grain was sold at 7 manas for a hana, when there was a very bad famine. The renovation of the tank may have served both the purposes of finding employment in famine time and as security for the future.

Two inscriptions of 1556 A.D. which are close to one another in Rayadurgasime in Muradi and Karadihalli respectively contain representations from the local people about the illegal extortions of their officers. The king Sadasivaraya issued orders exempting the residents of those villages from paying those illegal taxes and the
taxes illegally collected were ordered to be used for the repair of public works like tanks and temples. It appears that some local officers were very oppressive and the central government had to intervene to set the matters right. But what is noteworthy is that not only were matters set right, but in the process necessary public works were constructed.

The inscription at Nakkarahalu (Hadagali taluk) of 1562 A.D. records that the officer of that place fixed the dasavanda payment on a canal at Nagarehal and granted manya lands to the village officers senubova, gauda, talara and joyisa. This shows that the leaders of the village community took interest in the maintenance of the irrigational facility in their village and were rewarded for it.

Hiriya Kempegowda (1521-1569 A.D.), the founder of Bangalore, was the builder of several tanks in the city of which the most famous was the Kempambudhi tank. This tank is situated to the south-west of Gavipuram and is built by constructing a dam across a narrow valley between two hills, one touching Chamarajpet and the other extending to Gavipuram. He also built the Dharmambudhi tank (the present Bus Stand area). Bangalore is at a high altitude and rain water from here used to go to Koramangala, Adugodi and then to Challaghatta tank and still further to the tanks at Yamalur and Bellandur. The water which went still further was dammed at Varthur by Kempegowda. And finally, the water reached the North Pinakini.

Like the Kempegowda family of Yelahanka, the Nayakas of Keladi also started their career as chieftains under the
Vijayanagara rulers. The second ruler in this dynasty was Sadasiva Nayaka (1512 - 46). He constructed more than fourteen tanks around his capital Keladi. Of these, Hiriyakere is the main one and it is still in good working order. So technically sound is the construction of this tank that it has never dried.

The Madag-Masur tank was probably constructed by the same Sadasiva Nayaka under instructions from Krishnadevaraya of Vijayanagara. An inscription on the bund of this tank says that the sluice was repaired in 1863 A.D. More about this tank will be found in Appendix 4.

**Post - Talikota Period (1565-1799)**

**A Period of Peace (1565 - 1635)**

After the battle of Talikota or Rakkastangdi and the defeat in it of Vijayanagara, the capital was shifted to Penugonda. In Karnataka, the Keladi Nayakas, the Chitradurga Palegars and the Mysore Wodeyars continued the tradition of that great empire in carrying out welfare activities such as building tanks and temples, but their resources were limited and they were further frittered away in internecine fights. A few examples of the construction and renovation of tanks in these years will now follow.

The inscription in Keladi village in Sagar taluk of 1573 A.D. issued by Ramarajanayaka of Keladi states that the estates of all *settis* or merchants of Keladi, in case they die without having any issues, their elder or younger brother or kinsmen may enjoy the estate. If none such
was forthcoming, the widow of the deceased might take the estate and that which was left might be given away for a tank embankment or a temple. This shows the importance given to the maintenance of public works.

The Sidrayanakote (Chitradurga district) inscription of 1574 A.D.\textsuperscript{39} records that the tank to the west of the village was in a breached condition for a long time. The gauda, senabova and others of the village petitioned the Mahanayakacharya (the local Chief Paddannayaka of Harati). They offered to build the tank if the lands under the sluice were granted to them. The lands under the sluice would get water first and hence their desire to get that land.

One Srungaramma, a well-known actress in dramas made her village famous by building a tank called Srngarasagara. The village also was called by the same name. This is according to two inscriptions at that place of 1599 A.D.\textsuperscript{40}

The inscription of 1612 A.D. at Melukunte\textsuperscript{41} in Sira taluk refers to the services of an irrigation official who was engaged in the management of water under the tanks. It refers to a dispute about the office of nadagaudike between two candidates and it is claimed in the record that one party lost the case because the channel overseer’s letter in this connection was proved to be false. Probably, the channel overseer was one of the witnesses. That there was an officer to oversee the channel is very interesting.

An inscription of Sorab taluk of 1613 A.D.\textsuperscript{42} indicates that when Mugur agrahara tank was excavated, the land under Sangisetti pond of Thimmapura which had been
given for God Virabhadra of Neralige was submerged by the tank. Therefore, the land under the Kane pond in Neralige was given in lieu of the submerged land. This demonstrates clearly as to how difficult it was to build a new tank without submerging area under an already existing tank.

An inscription at Holur in Kolar taluk of 1628 A.D.\textsuperscript{43} indicates that the lands granted as Kattukodige or maintenance grant to four Reddis was the land which had been granted to someone else. Perhaps this indicates that the land which had previously been granted to someone else for the same purpose was taken away from them for allowing the tank to remain in disrepair.

At Mittemari, in the Bagepalli taluk, an inscription of about 1636 A.D.\textsuperscript{44} says that the Mahanayakacharya Kadireppa Nayani granted to Mekola Bomma, a dasavanda or maintenance grant :- "In Mittemaristhala, the Lingam Vaddu being breached and you have repaired and enlarged it; from the wet land, under it, one fourth part is granted to you as dasavanda to be enjoyed by you and your posterity." Dasavanda as the name indicates should be one-tenth. But it is some times different; here it is one-fourth and elsewhere it is three-tenth.

A Period of Wars (1636 - 1799)

The political situation in Karnataka suddenly changed for the worse from the year 1636 A.D. In that year, the Mughals made peace with the Adil Shahis of Bijapur after the latter submitted themselves to their might. Bijapur agreed to pay tribute to them. Peace with the Mughals
enabled the Adil Shahis, under Muhammad (1627 - 1656 A.D.) to turn their attention to central and south Karnataka which was divided among a number of chieftains at war with one another. Bijapur took advantage of this division and sent a series of expeditions one after the other from 1636 A.D. onwards. This period of warfare which began in 1636 A.D. continued with short intervals practically till the fall of Srirangapattna to the British in 1799 A.D.

The Adil Shahi expeditions convulsed the whole of middle and south Karnataka. They were succeeded by Shivaji's famous Karnataka expedition in the years 1677 - 78 A.D. Shivaji's successors fought a guerilla war with Aurangazeb's forces in Karnataka during the closing years of the 17th century and the beginning of the 18th century. The Peshwas who succeeded the House of Shivaji gave no rest to the rulers and people of Karnataka and their expeditions continued practically through the greater part of the 18th century. The fight between the Peshwas on the one side and Hyder and Tippu on the other became very bitter and wrought great havoc to the irrigational works built earlier. The damage can be imagined by Hyder's instructions to his officers on the eve of one of those Maratha invasions viz., Peshwa Madhava Rao's invasion of 1766 A.D. Hyder instructed them "to break down the embankments of the reservoirs of water, on the approach of the Maratha army; to poison the wells with milk hedge, to burn all the forage .......... to bury the grain ...... and to leave to the Maratha neither forage, water, nor food." 45 Necessity forced the people subject to Maratha invasions to bury even their forage. "The Marathas accordingly made good their march across this imperfect desert." 46
There were four Anglo-Mysore wars between 1769 and 1799 A.D. The third and the fourth of these wars brought great misery to the people by disturbing their normal life and destroying their irrigational facilities. One or two examples should suffice. Cornwallis was marching with his army to Srirangapattana in 1792. Nine miles east of Srirangapattana, he came across in Arakere a dam of masonry built across the Kaveri.

The passage of the river below the dam was rocky and impracticable and it was supposed that the rupture of the dam would lower the water and facilitate the passage of the river; but such was the solidity of the work, that the pioneers of the army contributed little to the intended effect and the project was abandoned 47.

If the Arakere dam was saved by the strength of its construction, in the next war (1799 A.D.) the Tonnur lake was destroyed by Tippu himself. He had heard that the great lake of Tonnur or Moti Talab (the lake of pearls) had furnished water and its irrigation forage at a convenient distance from the capital (Srirangapattana) to several hostile armies at different periods. In the war of death or empire which he was resolved to wage, he decided that it should not exist. The dam was breached and the lake was emptied 48. After Tippu’s fall, Mysore was restored to the Wodeyars and Purnayya became their Dewan from 1800 to 1812 A.D. and during this period as will be seen later, he made it his special object to restore the earlier reservoirs. It is usually held that the decline of the irrigation tanks began with the coming of the British. This may be true of the areas under direct British rule. So far as south Karnataka
or old Mysore was concerned, the decline began with the wars of the 17th and 18th centuries. In the coming chapter, we will see how far the Government of old Mysore State succeeded in renovating the tanks, which were their precious heritage. We will also see how the Bombay and Nizam’s Governments dealt with the parts of Karnataka under their charge.

Notes and References


2. EC V Arasikere 159.

3. EC VIII (R) Arkalgud 107.

4. EC V Arasikere 115.

5. EC VIII (R) Arakalgud 11.

6. MAR 1941, p.46 and ECX - Bowringpet 11.

7. EC X Gauribidanur 6.

8. EC VII (R) Maddur 87 & 93.


10. EC V (R) Krishnarajanagar 92.

11. EC XI Davangere 23 and 29.

12. EC IX Kanakapura 97.

13. EC X Mulbagal 131.

15. EC III (R) Gundlupet 149.


17. EC IX Channapatna 2 & 4.


19. EC VI (R) Pandavapura 19.

20. EC III (R) Heggadadevanakote 89.

21. EC X Mulbagal 172 & 173.

22. EC VII Shikaripur 234.


26. EC IV (R) Pandavapura, No.135.


27. *EI* XXXI, No.21.


30. *SII* IX, ii, No.528.

32. *EC* IV (R) Chamarajanagar 232.


34. *Ibid* 5.

35. *SII* IX, ii, No. 676.

36. *MAR* 1935, p.25A.

37. C.T.M. Kotraiah, *Irrigation Systems under Vijayanagara Empire* (MS) p.171. For the tanks in the Keladi Kingdom, see M.S. Puttanna, *Ikkeri Samsthanda Charitre*, and also Dr.K.G.Venkatesh’s article in *Itihasa Darshana*, VI, p.143 ff on the same subject.

38. *MAR* 1930, No.60.


40. *EC* XII Kunigal 29 & 30.


42. *EC* VIII Sorab 953.

43. *EC* X Kolar 220.


BRITISH PERIOD AND LATER
1800 - 1956

Introduction

After the defeat of Tippu in 1799 and of the Peshwas in 1818, the whole of Karnataka came under the British. The Wodeyars began to rule in Mysore; the Madras Presidency came to include the districts of South Kanara, Bellary and Kodagu and the Bombay Presidency got the districts of Belgaum, Dharwad, Bijapur and North Kanara and the Nizam got the districts of Bidar, Gulbarga and Raichur. We shall now study the developments in tank irrigation in Mysore, Bombay - Karnataka, Hyderabad - Karnataka, Bellary, Kodagu and South Kanara separately.

MYSORE

Before the British period, we do not have any record of the existing number of tanks, the area irrigated under them and the expenditure incurred on their construction or maintenance. Such information is available only with the commencement of the British rule. We shall study the number of tanks existing, the area irrigated under them and the expenditure incurred on their construction and maintenance since 1800, in that order.
The British Period And Later

Number of Tanks existing in 1800.

In 1799, immediately after the defeat of Tippu, the British commenced a geographical and statistical survey of Mysore. The memoirs of this survey¹, which ended in 1806, were compiled by Col. Mackenzie. From these memoirs, we come to know that there were more than 14,803 tanks and 8562 Coontas (smaller tanks). They do not give any details regarding the tanks in the present Shimoga District. The details as given for the remaining areas of Mysore are given in Appendix - 9.

These memoirs do not give us a complete picture as to how many of these tanks were in a ruined state and what was the area under irrigation. They only serve the purpose of indicating that a large number of tanks and anicuts existed in the beginning of the 19th century.

Number of Tanks (1800 - 1900)

In 1846, Col. Green, Chief Engineer, in his Memorandum on Public Works in Mysore, states that there were upwards of 20,000 tanks². And according to the “returns of 1853-54, there were 26,450 tanks in Mysore classed as municipal or unirrigating and irrigating. Of these, 4,106 were large irrigating tanks, 13,737 small and 8,609 unirrigating giving overall about one tank per square mile in the gross”³. Further, “of the 27,269 square miles covered by Mysore, nearly 60 per cent⁴ had been covered by tanks. In 1871, it was reported that according to the latest returns, “there were 36,265 tanks, of which 9,865 are out of repair, or yield low revenue⁵. The number of tanks in the different districts of Mysore in 1871 is given in Appendix 10. Nearly
80 per cent of the tanks were existing in the districts of Kadur, (now Chikmagalur) Hassan, Shimoga and Kolar.

In 1884, Sir K. Seshadri Iyer, Dewan of Mysore, in his address to the Representative Assembly spoke of the existence of about 38,000 tanks, large and small and said that it was extremely difficult to find a site suitable for a new tank.

In 1902, V. P. Madhava Rao, in his Memorandum on Minor Tank Restoration Scheme indicated that there were about 39,000 tanks of which about 10,000 were said to yield no revenue. Further, according to him, of these 29,000 tanks, 7000 were in a breached condition. A list of these tanks showing their atchkat (command area) and the revenue obtained from them is given in Appendix 11.

It is clear from this evidence that at the beginning of the 19th century, there were about 30,000 or more tanks, big and small, in Mysore. And at the beginning of the 20th century, their number was the same. Many of them were in a breached condition. The restoration of these tanks was the main task during this period.

Area under Irrigation: (1804 - 1874)

Even though the various inscriptions of the earlier period tell us about the existence of a large number of tanks and channels, they do not give us any information regarding the area that was under irrigation.

We learn for the first time in 1804, from the report of Wilks, Acting Resident of Mysore, that the ‘wet-land
cultivated' in the province of Mysore in 1803 - 04 was about 8,13,491 acres. The next available information regarding the area under irrigation is given in a report of the Chief Commissioner of Mysore, in 1871. This report gives us the area under 'wet and garden cultivation' for the period 1837 to 1867. The data relating to the period 1804 to 1836 is not available.

The average annual area under "wet and garden cultivation" during the period 1837 to 1867 was as below:

1837-38 to 1841-42 - 3,41,030 acres
1842-43 to 1846-47 - 3,69,952 acres
1847-48 to 1851-52 - 4,17,586 acres
1852-53 to 1856-57 - 4,32,062 acres
1857-58 to 1861-62 - 4,33,808 acres
1862-63 to 1866-67 - 5,07,345 acres

For the period 1867-68 to 1872-73 and 1878-79 to 1879-80 complete data relating to the area under 'wet and garden cultivation' is not readily available. The average annual area for the period 1873-74 to 1877-78 was 6,60,618 acres.

All this area under wet cultivation includes area irrigated under tanks, river channels, wells, spring channels, jungle streams, etc. The breakup of this area, showing specifically the area under tanks or river channels is not available for this period. The area under tanks and river channels is available for the period 1880-81 and beyond. Before we take a look at the area under tanks and river channels since 1880-81, we notice that the area under wet
cultivation which was 8,13,491 acres in 1804, had come
down to 3,41,030 by 1837-38. It is difficult to explain as
to why such wide variation occurs in a period of about
33 years.

One explanation could be that the figure indicated
by Wilks was not based on actuals but was an assessment
based on revenue records, in a period when land was
measured in terms of khandugas of seed sown, which differed
from place to place depending on the type of soil, topography
of the land etc. In spite of such variation in the assessment,
it is possible that the area under wet cultivation was not
less than about 5 lakh acres. The decline in this area
between 1804 to 1837 was perhaps due to the neglect and
unstable conditions that existed after the exit of Purnaiya
in 1811, and the taking over of the administration by the
Maharaja.

Development of irrigation from 1880 to 1950:

With a concerted programme of restoration of tanks
and taking up of a number of fresh irrigation tanks and
channels, the irrigated area under the channels and tanks
which was 3,22,985 acres in 1880-81 rose to 6,05,960 acres
in 1900-01 and went up to 8,14,923 acres in 1950-51. The
table in Appendix 12 gives the yearwise area under tanks
and river channels for the entire period from 1880 to
1950\textsuperscript{10}.

A look at these figures indicates that between 1880
to 1900, there was an increase in the irrigated area both
under channels and tanks. In the period between 1900
to 1930, the increase in the irrigated area both under
channels and the tanks continued but the increase under channels was appreciable. However, during the period 1930 to 1950, there was a steady increase in the area irrigated under channels, while there was a decreasing trend in the area irrigated under tanks. This can be seen clearly from the table below:

| Period  | Area Irrigated | Increase / Decrease in Area Irrigated |
|---------|----------------|
|         | Under channels (Acres) | Under Tanks (Acres) | Under channels (Acres) | Under Tanks (Acres) |
| 1880 - 81 | 59,784 | 2,33,201 | + 46,261 | + 2,66,614 |
| 1900 - 01 | 1,06,045 | 4,99,815 | (77%) | (110%) |
| 1930 - 31 | 1,65,307 | 5,77,364 | + 59,262 | + 77,549 |
| 1950 - 01 | 2,76,377 | 5,38,546 | + 1,11070 | - 38,818 |
|          | (Acres) | (Acres) | (56%) | (15%) |

The increase in the area under channels was due to the extensions and improvements to existing river channels and due to the construction of reservoirs like Vanivilassagar, Krishnarajasagar, Anjanapur Reservoir, Bhadra anicut channels and others. The rapid increase in the area under tanks from 1880 to 1900 was due to restoration of many major tanks and the decline between 1930 and 1950 was perhaps due to non-functioning of many existing tanks and very few tanks being taken up for construction.

As indicated by the then Chief Engineer in 1873, there existed very few suitable sites for locating new tanks.
and restoration of old existing tanks only was possible. This aspect, when examined with reference to the Memorandum prepared by V. P. Madhava Rao in 1902, wherein it is stated that there were existing 6,935 breached and 22,080 good tanks with an atchkat of 8,05,349 acres under them, brings out clearly the neglect of the old existing tanks. The potential area under tanks which was 8,05,349 acres in 1902, had come down to 5,38,546 acres in 1950, even though a number of new tanks had been constructed during this period of about 50 years. This clearly shows that many of the tanks existing in 1902, had gone out of use due to neglect.

Expenditure on irrigation works: (1800 - 1891).

Now let us examine the expenditure incurred on the construction, repair and maintenance of tanks and river channels.

In 1799, according to Wilks, the tanks which had been broken and disused from one to two hundred years were visible in every part of the country and very many were overgrown with jungle and forgotten or unknown\textsuperscript{11}. During the administration of Dewan Purnaiya from 1800 to 1810, the work of restoring the old tanks and the anicut channels was undertaken. The expenditure incurred on irrigation work during this period was on an average about 2,86,154 rupees annually\textsuperscript{12}. 
<table>
<thead>
<tr>
<th>Year</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1799-1800</td>
<td>Rs. 3,86,670-8-9</td>
</tr>
<tr>
<td>1800-1801</td>
<td>4,48,946-0-7</td>
</tr>
<tr>
<td>1801-1802</td>
<td>2,78,197-8-5</td>
</tr>
<tr>
<td>1802-1803</td>
<td>2,17,762-14-7</td>
</tr>
<tr>
<td>1803-1804</td>
<td>1,90,836-5-10</td>
</tr>
<tr>
<td>1804-1805</td>
<td>3,69,355-10-3</td>
</tr>
<tr>
<td>1805-1806</td>
<td>3,36,018-6-9</td>
</tr>
<tr>
<td>1806-1807</td>
<td>2,76,363-10-3</td>
</tr>
<tr>
<td>1807-1808</td>
<td>3,00,742-15-9</td>
</tr>
<tr>
<td>1808-1809</td>
<td>1,89,408-11-10</td>
</tr>
<tr>
<td>1809-1810</td>
<td>1,53,389-12-8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Rs.31,47,693-9-8</strong></td>
</tr>
</tbody>
</table>

During his eleven years’ administration, Purnaiya spent on an average annually Rs.2,86,184 or 3.39 per cent of the revenue on irrigation works. A very considerable part of this expenditure appears to have been incurred on the repair and reconstruction of the anicuts and anicut channels across the Kaveri. This is evident from the fact that the Madras Government represented in 1807 “the injurious effects to the Company’s territories by these works”; (this objection was ably rejected in March 1807 by Wilks and Mackenzie). Taking into account the probable expenditure incurred on the anicut works, perhaps not more than Rs.1.50 to 1.75 lakhs have been spent exclusively towards the repairs of existing tanks.

During the period 1812-1831, when the administration was under the Maharaja of Mysore after the exit of Dewan Purnaiya, the work of improvement to tanks was neglected. The British took over the administration of Mysore in 1831. From 1831 to 1856, the money spent on the restoration
and repair of tanks was about Rs.80,000 per annum, being 1.1 per cent of the average annual revenue of about Rs.72.67 lakhs\textsuperscript{13}.

<table>
<thead>
<tr>
<th>Period</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1831-32 to 1835-36</td>
<td>Rs.1,22,315-5-3</td>
</tr>
<tr>
<td>1836-37 to 1840-41</td>
<td>Rs.3,54,077-13-7</td>
</tr>
<tr>
<td>1841-42 to 1845-46</td>
<td>Rs.3,55,720-4-6</td>
</tr>
<tr>
<td>1846-47 to 1850-51</td>
<td>Rs.4,76,247-2-6</td>
</tr>
<tr>
<td>1851-52 to 1855-56</td>
<td>Rs.6,88,932-13-0</td>
</tr>
</tbody>
</table>

\[ \text{Average} \quad \text{Rs.19,97,293-6-10} \]

\[ \text{Average} \quad \text{Rs.79,891-10-0} \]

After the formation of the Public Works Department in 1856, this work received greater attention than at any time previously. About 5,000 tanks are reported to have been restored during the period 1856-1876, the average annual expenditure being about Rs.1.5 Lakhs\textsuperscript{14}.

During the next period from 1877-78 to 1890-91, the average annual expenditure on irrigation works was as below:

<table>
<thead>
<tr>
<th>Period</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1877-78 to 1880-81</td>
<td>Rs.3,02,155</td>
</tr>
<tr>
<td>1881-82 to 1885-86</td>
<td>Rs.3,64,255</td>
</tr>
<tr>
<td>1886-87 to 1890-91</td>
<td>Rs.8,82,092</td>
</tr>
</tbody>
</table>

The average annual revenue during this period was Rs.1,030,496 and the expenditure on irrigation was about 6.5 per cent of the total revenues\textsuperscript{15}.

For the succeeding period beyond 1890-91, exact figures are not readily available. However, it is seen that the same trend as during the earlier periods was continued.
It is however noticed that during 1938-39 a Special Irrigation Development Fund was created for financing large irrigation works of a protective nature\textsuperscript{16}.

It can be said, therefore, that great attention was paid to construction and repairs to irrigation works during the periods 1799 to 1810 and 1877 to 1891. During the period 1811 to 1876 the attention bestowed on irrigation works was not appreciable.

Sankey’s scheme to improve irrigation works:

In 1866, the Government of India desired that the State should review its irrigation works, completed and in progress, ‘to prevent the occurrence or mitigate the severity of drought and famine’. Major Sankey, the then Chief Engineer of Mysore, made out a strong plea that attention must ‘primarily be devoted to the repair, development or reconstruction of existing tanks and channels’\textsuperscript{17}. According to him it would ‘require some ingenuity to discover a site within this great area suitable for a new tank’. He further made out that a new tank ‘would be almost certainly found to cut off the supply of another lower down the same basin- to interfere in fact with vested interests”\textsuperscript{18}. His emphasis was in evolving a scientific management of the entire tank system instead of repairing and restoring relatively important and large tanks connected with large communities.\textsuperscript{19}

In 1871, Sankey wrote that,

The tanks in Mysore are not, as a rule, single reservoirs, but are situated one below the other
in chains, the upper tanks surplusing into those immediately below them. The surplus channels of these chains converging and falling into each other form drainage lines across which other reservoirs have been constructed.\(^{20}\)

A tank series consisted of a number of such chains. A series was composed of 2 to 200 tanks or even more and covered an area of two to three hundred square miles.

The uppermost tanks of each series were as a rule very small, having little or no cultivation below them, and were useful as silt traps and for watering cattle etc. Below these, came village tanks, on which the villagers depended for their supply of water and had cultivation below them. The bulk of each series was made up of the above two classes of tanks. The revenue of the village tanks seldom exceeded Rs.500. Considering Rs.5.00 per acre as the assessment then existing for wet lands, this indicates that the village tanks had a command area of 100 acres or less. In each series there were one or more important tanks yielding a revenue of Rs.1000 to 5000 or even more.

Sankey writes,

By improving an upper tank, it is often possible to do away altogether with that below, and to irrigate from the upper tank not only all the land previously irrigated, but the bed of the abandoned tank besides, with the additional advantage of having one tank to maintain, instead of two.... Each series of tanks must form one project, and be treated as one, be accurately surveyed and
plotted, a carefully considered scheme drawn up and approved, the work carried out under competent supervision, after which the tanks comprising it may be handed over for upkeep to the ryots themselves\textsuperscript{21}.

Such a comprehensive scheme involved additional expenditure on establishment and large sums for the construction work. The probable cost of repairing and restoring 19,223 tanks (excluding the tanks in Shimoga and Kadur districts), was assessed as about Rs.48 lakhs. The work was proposed to be completed in a period of twelve years\textsuperscript{22}.

Correspondence between the Commissioner's office and the Government of India was set in motion on this proposal. Letters were exchanged as to whether the administration of such a scheme should be strictly under the Engineering Department or under the control of the Revenue or Civil officers. There was also a discussion as to whether construction of railways should be given importance or not. Meanwhile, from 1876 to 1878, the State faced severe famine. The net effect of this chain of events was neglect of the proposal made by Sankey. It was left to the State after Rendition in 1881 to improve its irrigation facilities.

**Repairs and maintenance of tanks:**

After the British took over the administration of the State in 1831, the system of maintenance of tanks by the village community which had received a setback in the earlier period, due to frequent wars, suffered a further blow, due to their system of village administration. Further,
the British concentrated on repairs and maintenance of large tanks and river channels, which gave them assured revenue. A large number of tanks, which were small, were neglected. Faced with this difficult situation, instructions were issued in 1863 to the village authorities throughout the State to enforce the customary duties of villagers in executing minor works of repairs to irrigation works. With a view to enable such repairs being carried out by the villagers, concessions like reduced wet assessment for a period of thirty years were granted to individuals who undertook the repair or restoration of tanks.

Again in 1873, it was proposed to hand over to the villagers for further maintenance and upkeep all tanks restored by Government. All landholders deriving benefit from the tank either directly or indirectly were held responsible for the maintenance of tanks. The patel (headman) of the village was entrusted with the work of enforcing these duties on the landholders. Detailed rules were framed and issued in this regard in October 1873. These have been described in detail in another chapter in this book.

As regards tanks which had not been restored, no definite rules could be laid down, as the ryots could not be called upon to restore or repair works which had been neglected for a number of years. After correspondence with the Government of India, it was laid down that no public money should be spent on the restoration, repair or maintenance of any tank, the average revenue from which was less than Rs.100. These small tanks were left exclusively to the care of village communities concerned. And even in the case of other tanks, the restoration of a ruined tank or a tank out of use, it was decided that a
proportion of the cost should be borne by the *ryots* but no pressure was to be employed to induce them to agree to the contribution. But if two-thirds or three-fourths of the *ryots* were willing to enter into a *mutchalike* (agreement) to make the contribution, it was ordered that the minority should fall in line with the view of the majority.

Sir K. Seshadri Iyer, Dewan of Mysore, observed in 1884 that,

*Any reform in our tank system must start with a clear recognition of the fact that it is beyond the ability of Government to undertake the repairs and maintenance of all tanks in the province, nor will it be equitable to throw the burden on the *ryots* after the village system or what little remained of it has been disorganised and after the *ryot* has tacitly been relieved of his responsibility by the imposition of special cesses for the repair of tanks*²³.

**Seshadri Iyer's Scheme for restoration of tanks:**

In 1885, shortly after his address to the Representative Assembly regarding the existing state of tanks, Dewan Seshadri Iyer introduced a scheme for restoration of tanks. According to this scheme, as finally adopted in 1887, all tanks yielding a revenue of Rs.300/- and less were treated as minor and their restoration was treated as the responsibility of the *ryots*. The *ryots* were required to do the earth work themselves and Government undertook to execute the required stone and masonry work. On restoration of the tank to the required standards, it was to be handed over
to the *ryots* for upkeep as laid down in the rules made in 1873.

The restoration of all other tanks, yielding a revenue of more than Rs.300/- was ordered to be carried out by the Government (Public Works Department) with the help of contribution from the *ryots*. It was anticipated that under this scheme, the entire tank system of the State would be brought to a satisfactory condition within ten to fifteen years. The Administration Report of 1890-91 states that under the Tank Restoration Scheme, “891 tanks have been dealt with and earth work to the value of Rs.66,000/- was carried out by the *ryots*”. Minor tanks with a revenue of Rs.100/- and which had been exclusively left in the hands of the village community were also brought under the Tank Restoration Scheme in 1904.

In 1902, V. P. Madhava Rao, in his Memorandum on Minor Tank Restoration Scheme indicated that since 1870-71 to date 2,831 major and minor tanks had been restored, and there were still 1,013 and 25,016 major and minor tanks respectively to be dealt with.

The entire operations under the Tank Restoration Scheme was reviewed in 1914 and it was observed that only about 2,500 tanks had been restored during 25 years and about 19,500 tanks were still awaiting restoration. With a view to accelerate the progress of work, it was proposed that in lieu of the existing system of the villagers executing the earth work, they should be required to contribute one-third of the total cost of restoration and the balance of two-thirds being met by Government. It was also proposed that this work should be entrusted to
the villagers themselves. It was hoped that as a result of these measures about 1,000 tanks would be restored every year involving an outlay of Rs. 8 lakhs. Of this amount it was expected that about Rs.2.66 lakhs would be received as contribution from the villagers. However, these expectations were not fulfilled and there was no increase in the number of tanks restored. The principal cause of failure was the lack of enthusiasm on the part of the landholders to perform their share of the task and the Government not being in a position to induce them or to take up this work by itself. Even in 1932-33, only 2,348 major tanks and 4,757 minor tanks had been restored out of 2,656 major and 20,803 minor tanks. And in 1946-47 there were still 14,299 minor tanks to be restored. Even though most of the major tanks were restored, nearly 70 percent of the minor tanks had remained in disuse.


Even though emphasis was on the restoration of existing tanks, action was taken, after the rendition of the State in 1881, to take up the construction of new tanks wherever feasible. Some of the important and large works undertaken were:

1. Ramasamudram across Chitravati in Sidlaghatta taluk.
5. Tank across Medarahalla in Hiriyur taluk.
8. Kallehalli tank in Chitradurga.
11. Chikkamadure tank in Challakere taluk.
12. Thimmanaikanahalli Agrahara tank in Sidlaghatta taluk.

All these new and existing storages were across minor streams which failed when the rains failed. Unlike the ghat-fed rivers like the Kaveri, the Hemavathi, the Bhadra, the Tunga., etc., the drainage or yield of the minor streams was limited and uncertain. Investigations were, therefore, taken up to build storages across the ghat-fed rivers. Construction of Vanivilas sagar (Marikanive project) across Vedavathi near Chitradurga and Krishnarajasagar (Kannambadi) across the Kaveri near Mysore were taken up in the early period of the 20th century. The Vedavathi river across which Vanivilas sagar is built receives its supplies chiefly from maidan areas and is to a small extent fed by ghat rainfall. An ideal site for constructing a large storage and assuring water supply to the existing anicuts below the dam on the river was the main reason for taking up this work.

With the successful construction of these two large reservoirs and the need felt for harnessing the waters of the main rivers by building storages across them, emphasis
was laid on the planning and construction of large storage reservoirs. The largest tank (reservoir) till then was the Sulekere in Channagiri taluk. A detailed description of this tank is given in Appendix 2. Likewise, the highest dam in Mysore was the Watadahosahalli Amanikere in Gauribidanur taluk. A detailed description of this tank is given at Appendix 7.

The highest earthen dam built in the early decades of 20th century was the Anjanapur Reservoir across the Kumudvati in Shikaripur taluk. It was 63 feet high above the river bed and had a water-spread of 1.89 square miles when full.

Some of the other important works constructed during this century upto 1956 were:

1. Ketohalli tank in Closepet (Ramanagar) taluk.
2. Maralwadi tank in Kanakanahalli (Kanakapura) taluk.
5. Thippagondanahalli tank across Markandeya in Bangalore taluk.
6. Thumbadi tank in Koratagere taluk.
7. Ragimallalahalli tank across Markandeya in Bangarpet taluk.
8. Nidsale tank in Kunigal taluk.
11. Sowalanga tank in Honnali taluk.
12. Pokurthi tank in Molakalmuru taluk.
14. Herige tank across Vadli in Hassan taluk.
15. Alahalli tank in Kanakanahalli (Kanakapura) taluk.
16. Irkasandra tank in Koratagere taluk.
17. Gadimanakunte tank.
18. Tuppadahalli tank.
20. Markonahalli reservoir in Kunigal taluk.

The only other major work commenced in Mysore prior to 1951 (Pre-plan period) was the reservoir across the Bhadra river near Lakkavalli.

**Bombay - Karnataka**

**Area Under Irrigation**

Now, let us examine the status of irrigation in the districts of Belgaum, Bijapur, Dharwad and Uttara Kannada. These districts formed part of the Bombay Presidency till they were merged in the Mysore State in 1956.

The earliest available information relating to irrigation in this region is obtained from the Gazetteers of the Bombay Presidency. According to the Gazetteers (1884), the number
of tanks existing and the area irrigated by them were as below :-

<table>
<thead>
<tr>
<th>District</th>
<th>Number of Tanks and Kuntas</th>
<th>Area Irrigated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgaum district</td>
<td>1,055</td>
<td>16,000 acres</td>
</tr>
<tr>
<td>Dharwad district</td>
<td>2,979</td>
<td>93,730 acres</td>
</tr>
<tr>
<td>Bijapur district</td>
<td>32</td>
<td>1,372 acres</td>
</tr>
<tr>
<td>Uttara Kannada district</td>
<td>7,647</td>
<td>Not available</td>
</tr>
</tbody>
</table>

The next available information is from the report of the Irrigation Commission (1901). According to this report, the area irrigated in this region was 1,84,837 acres during 1896. Of this, the area irrigated under tanks was 94,518 acres and a major portion (81,843 acres) was in Dharwad district alone.\(^{26}\)

The corresponding number of tanks which supported this irrigation was 7,904. There were 4,631 tanks in Uttara Kannada, 2,404 in Dharwad, 10 in Bijapur and 859 in Belgaum districts.\(^{27}\)

In addition, there existed an equal number of tanks which were used solely for the supply of drinking water to human beings and cattle.\(^{28}\)

**Irrigation in Uttara Kannada district.**

Even though the largest number of tanks were found in Uttara Kannada district, the average area irrigated by each one of them was less than one acre. They were more
in the nature of small ponds or *kuntas*. In the dry season, dams of earth, stones and tree branches were thrown across the streams and the lands nearby were watered, the dam being removed at the close of the dry season, or left to be swept away by floods. Some places were watered by canals from large ponds or *keres* and small ponds or *kattes*.

**Irrigation in Dharwad district**

Since most of the tanks in Uttara Kannada were small ponds, the pride of place as a tank district goes to Dharwad district. Most of the tanks in this district are to the west of the road from Harihar to Belgaum. This belt has continuous rainfall and has sites which favoured the construction of irrigation tanks. Most of them are believed to have been constructed during the Vijayanagar period (1336-1565).

From the revenue records, it can be seen that in 1858, there were in Dharwad district more than 3,150 tanks, of which 535 were irrigating more than 50 acres each. And eight of these were irrigating more than 500 acres each. They were:

1. **Doddakere at Bujyukh Konankeri in Bankapur taluk** 654 acres
2. **Heggere at Haveri** 515 acres
3. **Dodkere at Hirekerur** 765 acres
4. **Dodkere at Devikop in Kalghatgi taluk** 433 acres
5. **Honwankere at Mugad in Dharwad taluk** 603 acres
6. Anikere at Holekoti in Hangal taluk 537 acres
7. Hirekere at Naregal in Hangal taluk 602 acres
8. Hirekere at Tilwalli in Hangal taluk 862 acres

Apart from these eight tanks, the old tanks at Dambal in Gadag taluk and at Masur in Hirekerur taluk were huge tanks though they irrigated less than 500 acres each. The Dambal dam 4,000 feet long and 25 feet in height had silted up and the tank was repaired several times during the period 1804-1880. As seen from the inscriptions, this tank was called Gonasamudra and was in existence in 1184\textsuperscript{29}.

The Madag-Masur dam, which is believed to have been built sometime in the 16th century had gone out of use owing to a breach. It was restored and irrigation commenced in 1865. A detailed account of this tank can be seen in Appendix 4.

The only other important old work was the Dharma canal system. Canals take off on either bank from a stone masonry \textit{anicut} constructed perhaps in the Vijayanagar times across the Dharma river, a feeder stream to the Varada river.

Except for a few small tanks like the Medleri tank and the Asundi tank taken up as famine relief works, no new tanks were built in the Dharwad district during the 19th and 20th centuries prior to 1956.
Irrigation in Bijapur district

In the Bijapur district according to the returns of 1900-01, the following tanks were existing:

1. Mamdapur *Doddakere* 645 acres
2. Mamdapur *Sannakere* 55 acres
3. Kumatgi tank 55 acres
4. Sirur tank 16 acres
5. Banashankari *Honda* 40 acres
6. Nilgund Arkeri 3 acres
7. Timsagar *Doddakeri* 72 acres
8. Timsagar *Sannakere* 35 acres
9. Parvathikere 32 acres
10. Parvithikere Ganjikere 44 acres
11. Kendurkere 256 acres

The Kendur tank is said to have been built before the Bahamani rulers conquered this area (1347). The Mamdapur tank is learnt to have been constructed during Muslim rule.

The only tank built in the 19th century was the Muchkundi tank (1882) near Bagalkot. It is a 60 feet high masonry dam with an irrigable command of 5,417 acres. The construction of Sangoji tank in Indi taluk and Hullur tank in Muddebihal were taken up as famine relief
measures. The only other tank constructed earlier to 1956 was the Nandargi tank. The work was taken up as a famine relief work in 1938. It is an earthen dam 42 feet high.

Development of irrigation in Bombay-Karnataka 1901 - 1956

The idea of utilizing the waters of the Ghataprabha, the Malaprabha and the Krishna rivers which flow in the districts of Belgaum, Dharwad and Bijapur for increasing the area under irrigation was always under active contemplation. The only scheme that took shape was the construction of the Dhupdal weir across the Ghataprabha near Gokak and the taking off of the left bank canal from it to irrigate about 17,000 acres and to provide 68 cusecs of water for the Gokak mills to enable them to generate hydropower at the Gokak falls.

By 1936, the area irrigated under all tanks and canals in Bombay-Karnataka was 1,65,617 acres\(^3\).

<table>
<thead>
<tr>
<th>Canal</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gokak canal</td>
<td>8,293</td>
</tr>
<tr>
<td>Dharma canal</td>
<td>5,703</td>
</tr>
</tbody>
</table>

1. Belgaum district and Bijapur district 750 tanks 26,797 acres
2. Dharwad district 2,348 tanks 90,393 acres

By 1955-56, the area under irrigation had increased to 2,04,170 acres\(^3\).
<table>
<thead>
<tr>
<th>District</th>
<th>Area irrigated under Canals (acres)</th>
<th>Tanks (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgaum</td>
<td>33,229</td>
<td>16,763</td>
</tr>
<tr>
<td>Bijapur</td>
<td>2,178</td>
<td>1,262</td>
</tr>
<tr>
<td>Dharwad</td>
<td>7,935</td>
<td>1,08,204</td>
</tr>
<tr>
<td>Uttara Kannada</td>
<td>1,215</td>
<td>33,384</td>
</tr>
</tbody>
</table>

A look at the figures relating to the number of tanks existing and the area irrigated under them reveals that there was a steep decline due to the neglect of old tanks and due to not taking up any new irrigation works, till the beginning of the 20th century. It was only after the Irrigation Commission (1901) in its report stressed the need for taking up protective irrigation works against the recurrent famines that priority was given to taking up new works or improving the existing works. Had there been no famines, which required taking up of famine relief labour works, the British who took up irrigation works only when they were remunerative would not have taken up repair or reconstruction of old tanks on any appreciable scale.

The sum spent to maintain or repair the tanks was very paltry compared to the revenue realised. In the Dharwad collectorate, the revenue realised for eleven years ending 1851 was rupees ten and a half lakhs, where as the amount spent on tanks and wells was only about one-fifth per cent of the revenue realised. In Belgaum, in the five years ending 1850-51, a total of Rs.3,811/- was spent both on tanks and wells, while the revenue realised for
that period was rupees twelve and a half lakhs. It was a “story of uniform indifference and stupendous neglect”\textsuperscript{33}.

In the Bombay Presidency, all irrigation works were classified as first class and second class works. The former category consisted of works for which capital and revenue accounts were maintained. These were works on which capital investment was made and regular revenue accrued to the State. The second class works were small and unremunerative for which no capital investment was made and revenue accounts were not kept as the revenue obtained was considered uncertain and meagre. The second class irrigation works found a place in the Bombay Irrigation Act (1879) only in 1914 and it was laid down that petty repairs such as filling up of ruts, prevention of growth of vegetation, clearance of silt, etc., were an obligation to be performed by the land-holders under the irrigation works. The maintenance and repairs to all such tanks were carried out by the Government only if the beneficiaries under that work made an application to Government and agreed to contribute 10\% of the estimated cost of the repairs.

In 1938, only the following nine works were treated as first class works and all other works (6,755 tanks) were treated as second class works\textsuperscript{34}:

1. Muchkundi tank, Bijapur district.
2. Gokak canal - 1st stage - Belgaum district.
3. Gadikere tank, Belgaum district.
4. Medleri tank, Dharwad district.
5. Madag tank, Dharwad district.
6. Asundi tank, Dharwad district.
7. Dambal tank, Dharwad district.
8. Dharma canal, Dharwad district.

Bellary

Irrigation as existing in 1807.

The Bellary district, one of the three districts which were ceded to the East India Company by the Nizam of Hyderabad in 1800, was part of the Madras Presidency, till it was merged with Mysore in 1953 on the formation of the Andhra State. According to the survey conducted by Thomas Munro in 1807, the cultivated area in the taluks of Bellary, Kampli, “Harapanahalli, Koodigere and Hoovinhugalli” was 9,31,068 acres. The area under irrigation was only 41,815 acres\textsuperscript{35}.

The irrigation works which supported the area were:-

<table>
<thead>
<tr>
<th></th>
<th>In repair</th>
<th>Out of repair</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanks</td>
<td>222</td>
<td>255</td>
<td>477</td>
</tr>
<tr>
<td>Wells</td>
<td>1,633</td>
<td>1098</td>
<td>2,731</td>
</tr>
<tr>
<td>River channels,</td>
<td>170</td>
<td>37</td>
<td>207</td>
</tr>
<tr>
<td>(\text{Anes} &amp;,\text{dams})</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Status in 1870.

In 1870, the area under cultivation was 10,64,929 acres and the area irrigated was 46,554 acres. Even though the area under irrigation had increased the ratio of irrigated land to land under cultivation remained at the same level as was existing in 1807.

The corresponding irrigation works existing in 1870 were:

- Tanks: 233
- Wells: 4753
- River channels: 39
- Spring channels: 137
- Anicuts: 105

Some of the tanks which had an irrigation of more than 200 acres as in 1870 were only 15 as listed below:

- Daroji Tank: 1639 acres (Hospet taluk)
- Kamalapuram tank: 415 acres
- Dannaikanakere: 361 acres
- Avinamadagu: 228 acres
- Kudligi tank: 284 acres (Kudligi taluk)
- Kottur tank: 610 acres
- Hansi tank: 463 acres
- Ujjani tank: 426 acres.
- Nilgunda tank: 307 acres (Harapanahalli taluk)
- Hagranur tank: 289 acres
- Arsakere tank: 263 acres
- Bagali tank: 218 acres.
Maremahanhole tank 335 acres Hadagali taluk
Chintalpur tank 306 acres
Timbrahalli tank 282 acres.

Except for the Daroji tank, which is stated to have been restored during the reign of Tippu, all other tanks are small. A detailed account of this tank can be seen in Appendix 5. The Daroji tank is now fed from the Tungabhadra right bank high level canal. Kamalapuram tank is another tank which is fed by a river channel. It is fed by the Raya canal taking off from the Tungabhadra dam.

Most of these tanks are centuries old. The Bagali tank was constructed during the reign of Indravallabha, a Rashtrakuta ruler in 932 A.D.\textsuperscript{37}. The Kottur tank appears to have been existing during the reign of Tribhuvanamalla, the Chalukyan ruler in 1112 A.D.\textsuperscript{38}.

Further Development:

The irrigated area in Bellary district in 1953-54 was only 38,251 acres\textsuperscript{39}.

<table>
<thead>
<tr>
<th>Area irrigated (in acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) By canals 17,234</td>
</tr>
<tr>
<td>b) By tanks 12,788</td>
</tr>
<tr>
<td>c) By wells 7,828</td>
</tr>
<tr>
<td>d) By other sources 401</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>38,251</td>
</tr>
</tbody>
</table>
The area under tanks which stood at 18,703 acres in 1870 had come down to 12,788 acres in 1953. This was largely due to neglect of repairs to tanks and also due to non-functioning of the tanks on account of silting and encroachment of the tank bed etc. With the construction of the Tungabhadra reservoir and the canal system under it, the area irrigated has gone up. However, the irrigation under tanks has not shown any appreciable increase.

Hyderabad - Karnataka

Reliable statistics are not available for the cultivable or irrigated area in the old Hyderabad State. According to the Irrigation Commission (1901-1903)\textsuperscript{40}, out of a total of nearly 53 million acres comprised in the State, statistics were available only for about 23 million acres of cultivable and forest areas of Khalsa (Government) lands. Of this 2.5 million acres were under forest, and about 3 million acres were treated as cultivable waste. Out of about 17.5 million acres (as) under occupation in the year 1900, one million acres or less than 6 per cent was assessed as irrigable. The occupied and actually irrigated areas were as follows:

<table>
<thead>
<tr>
<th>Area of dry cultivation</th>
<th>Area assessed as irrigable</th>
<th>Probable net area irrigated (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(acres)</td>
<td>In a year of normal rainfall</td>
</tr>
<tr>
<td>Marathwada</td>
<td>85,81,165</td>
<td>2,35,447</td>
</tr>
<tr>
<td>Karnataka</td>
<td>44,96,725</td>
<td>58,430</td>
</tr>
<tr>
<td>Telingana</td>
<td>43,50,438</td>
<td>4,79,049</td>
</tr>
<tr>
<td></td>
<td>1,74,28,328</td>
<td>10,06,880</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
These figures indicate that the area under irrigation in the Karnataka districts (Raichur, Gulbarga and Bidar) was only about 1.5 per cent of the sown area. One other interesting feature was that the area irrigated in these districts in a dry year was about 80 per cent, of the area irrigated in a normal year. Whereas, in Telingana, an area studded with tanks, the area irrigated in a dry year was only about 2 per cent of the area in a normal year. The irrigation in the Karnataka districts was essentially dependent on canals taking off from the Tungabhadra river and hence this difference. The tanks in this region were few.

Even these figures of areas actually irrigated in Hyderabad State were derived by the Commission by deducting the areas for which remissions were granted from the total assessed areas. Apart from the fact that very few sites were available for building of tanks, the entire region was a neglected area.

According to the Revenue Administration Report of Hyderabad State for 1874, there were very few tanks of any importance in the Raichur district. They were all small tanks which filled only in exceptionally good season. Most of the wet cultivation was from the old channels taking off from the Tungabhadra river. Most of the anicuts and channels were out of repair. Apart from these existing anicuts and channels, there were a large number of anicuts and traces of former works could be seen every five miles along the course of the river\[41\].

In 1956, when the district became part of the Mysore State, the area irrigated under tanks was 10,590 acres and the number of tanks was 95\[42\].
The Administration Report of the Hyderabad State of 1874 indicates that the Bosgah tank at Gulbarga, which is now essentially the source of water supply to Gulbarga city was perhaps a large irrigation work, whose channel fed several tanks on its way to Gulbarga city. The tank had a bund of 2,195 feet in length and had a water-spread of 367 acres when full and had an average depth of 21 feet. The Administration Report states that, looking at the breadth of the bund, the flatness of the outer slope, and the care with which the revetment had been built, one could surmise that it was probably constructed by the Bahamani rulers prior to their migration to Bidar, when labour was cheap and expenditure on useful works was unstinted. The tank was, however, a breached tank in 1874 and there is no record as to when it had breached. The tank was restored in 1887 and it supplied water to the city of Gulbarga and also for some cultivation.

The report also mentions the Bonal tank situated about six or seven miles west of Shoranpur. The old tank had been enlarged by Col. Taylor in 1856. Its catchment area was 50 square miles and the water-spread when full was two and a half square miles.

In Bidar district, during 1931-36, the sown area was 10,66,767 acres and the area irrigated was 27,223 acres about 2.5 per cent of the sown area.\(^{43}\) The area irrigated from tanks was 3,116 acres, while the area irrigated under wells was 23,786 acres. The number of tanks existing was only about 36. This fairly agrees with the number of tanks that were existing when the district was merged in Mysore in 1956. There were 31 tanks in 1956 with an irrigated area of about 300 acres under them\(^{44}\).
Coorg or Kodagu

Coorg or Kodagu, an independent kingdom, came under the British in 1834 and was administered as a separate unit. It was merged in Karnataka in 1956.

The rainfall in this area being abundant and varying from upwards of 150 inches in the west to 40 inches in the east, there were few irrigation works in Coorg. In the beginning of this century, there were 27 irrigation works, tanks and small canals.

The area under irrigation in 1956-57 was 13,488 acres - 5,295 acres were under tanks, 7,990 acres were under canals and 203 acres were irrigated by other sources like spring channels etc. There were no wells. There were 218 small tanks and on an average, they commanded less than 30 acres each.

South Canara or Dakshina Kannada

The South Canara District Manual of 1894 gives a succinct account of the status of irrigation in the district which is as follows:

The rainfall during the south-west monsoon being unfailing and abundant there are no extensive irrigation works in South Canara. The rainfall alone was sufficient to ensure one crop even on lands, where there were no facilities for storing water, while the streams and springs which continue
to flow for some time after the rain had ceased, enabled the ryots to raise two or even three crops on low lying lands at the bottom of the valleys. For arecanut plantations, small tanks are usually made at the head of the valley in which the plantation is situated and for the second and third rice crops, the cultivators are in the habit of damming up of water in the streams and small rivers. Small anicuts of this kind are found in abundance all over the district though perhaps there are more in Uppinangadi taluk and fewer in Kasargod taluk, than elsewhere. For the annual construction of these dams, a slight remission called Kattutai was made long ago from the assessment. Though nothing was spent directly by Government in connection with irrigation, the number of small tanks supplied by springs and affording means of irrigation to different petty holdings were treated as Government property, and when the water supply is for one or two holdings, the tank was treated as attached to the holdings. Near the coast where water was found near the surface, large number of small private tanks or reservoirs were dug by private owners.\footnote{46}

In 1956-57, the total area irrigated from all sources in this district was 1,05,871 acres. Of this, 14,661 acres were under tanks, 7,129 acres were under wells and 84,081 acres were irrigated from other sources like spring channels, etc. The total number of tanks existing was 1,845. And of these only 6 were irrigating more than 100 acres each. The rest of the tanks were very small, irrigating on an average less than 6 acres each.\footnote{47}
Since 1956

Introduction

When the British took over Mysore and other parts of Karnataka in the 19th century they concentrated on the renovation, improvement and extension of existing works. The main test applied by them, for taking up the construction or renovation of an irrigation work was its being remunerative or productive. It was only after the occurrence of the famine of 1876-78 that attention began to be given to taking up of protective works. Simultaneously, a policy of assisting the construction of wells, etc., by private individuals came to be thought of. A system of granting loans and of concessions in land assessment was established.

Before sanctioning the construction of any work, its utility was determined by the financial productivity test. Any scheme taken up had to yield a certain percentage return on the sum-at-charge in the tenth year of its coming into operation. The sum-at-charge was the capital cost plus the arrears of interest upto that year. The Irrigation Commission (1901) which examined this criteria also held that there was no need to change the financial productivity test. Rigid application of this test continued even after 1947. (In 1949, the rate of return of 6 percent was reduced to 3.75 percent)\(^4\). It was only in 1964, that the Government accepted the criteria of testing the utility of an irrigation scheme based on the Benefit-Cost ratio.

With strict application of the productivity test, with the limited finances available and nearly every available
site across all streams, other than the ghat-fed streams like the Bhadra, the Tunga, the Tungabhadra, the Hemavathi and the Kaveri, having already been covered by a storage work (tank), there was little scope for construction of fresh storage works except across the ghat-fed rivers. These ghat-fed rivers did not traverse across areas most liable to famine and any attempt to convey these waters to such areas necessarily involved construction of large storage reservoirs and long length of canals. This situation therefore, resulted in the construction of Krishnarajasagar reservoir, the first major irrigation scheme in Karnataka.

Construction of Large reservoirs.

With the formation of Karnataka in 1956, the areas of Bombay-Karnataka, and Hyderabad-Karnataka were merged in Mysore State. Agriculture in these areas was mostly rain-fed and the irrigated area was a very small part of the cultivated area. Due to the rainfall being very low and country being mostly level, construction of tanks was generally not feasible. As rivers like the Tungabhadra, the Ghataprabha, the Malaprabha and others flowed through this area, construction of small storage tanks across these was not practicable. Further, small anicuts across these rivers did not command any appreciable area as the canals had to be very close to river. Irrigation of any considerable dimension was not feasible except by construction of large storage reservoirs across these rivers.

The feasibility of construction of large storage reservoirs (tanks) across the Ghataprabha, the Malaprabha, the Tungabhadra and the Krishna had been investigated by the British in the latter half of the nineteenth century.
But they could not be put into practice due to large expenditure involved and also due to the inter-state nature of the rivers. The Tungabhadra reservoir was started in 1945 as a joint scheme between the Madras Presidency and the Nizam’s Government. The reservoirs across the Ghatal-prabha, the Malaprabha and the Krishna, however, had to wait for a further long period and were taken up for construction only after 1956. Under all these schemes, which provide irrigation to areas in Hyderabad-Karnataka and Bombay-Karnataka, which for centuries were subjected to frequent famines and drought conditions, emphasis was on providing irrigation to non-paddy crops. Apart from the human and environmental problems posed by the construction of such large storages, the canals under all these reservoirs had to traverse a long length and irrigate fields in a black soil region with steep transverse slope where irrigation was not considered favourably for centuries and where irrigation was synonymous with the growing of paddy. The desire of the planners to spread the available water to as large an area as possible without necessary steps to create adequate facilities for drainage, land levelling, approach roads and improved agricultural inputs, has given rise to innumerable problems of water and land management. Honest analysis of the land and water management problems is necessary to obtain a solution to these problems.

Even though importance was given to large reservoir projects, the investigation and construction of small reservoirs or tanks was not totally neglected. In 1959, a separate organisation was established for the investigation of minor irrigation works. Construction of these works however
rested with the Public Works Department, which was in charge of all roads and buildings. It was only in 1984, that a separate organisation for the construction of minor irrigation tanks was formed. Till recently, the classification of irrigation works into minor or major was based on the estimated cost of the work. Works costing less than Rupees 25 lakhs were treated as minor irrigation works. At present, irrigation works which have an irrigation command of 5000 acres and less are treated as minor irrigation works, and works which have an irrigation command of 5000 acres and more are considered as medium and major irrigation works. The investigation, planning and sanctioning of minor irrigation works rests wholly with the State Governments. In respect of all other irrigation works, the scheme as framed by the State Government has to be accepted by the Government of India and the Planning Commission. All irrigation schemes, whether minor or otherwise, are executed as a part of the Five Year Plan. However, the inclusion of any major or medium scheme under the Plan, is based on the approval of the Planning Commission. Such a restriction does not exist in respect of minor irrigation schemes and the State Government can include any minor scheme according to its priorities within the outlay earmarked for such sectors.

Irrigation outlay and development during Plan periods:

As compared to the earlier period, irrigation works received a large impetus with the planned development under the Five Year Plans. The outlays incurred during each plan period are as below⁴⁹:
### Tank Irrigation In Karnataka

<table>
<thead>
<tr>
<th>Period</th>
<th>Outlay on major and medium irrigation</th>
<th>Outlay on minor irrigation</th>
<th>Total Outlay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-Plan and First Plan</td>
<td>37.27</td>
<td>4.15</td>
<td>41.42</td>
</tr>
<tr>
<td>2. Second Plan</td>
<td>29.82</td>
<td>5.08</td>
<td>34.90</td>
</tr>
<tr>
<td>3. Third Plan</td>
<td>33.99</td>
<td>15.79</td>
<td>49.78</td>
</tr>
<tr>
<td>4. Annual Plan</td>
<td>33.74</td>
<td>13.18</td>
<td>46.92</td>
</tr>
<tr>
<td>5. Fourth Plan</td>
<td>139.00</td>
<td>23.03</td>
<td>162.03</td>
</tr>
<tr>
<td>6. Fifth Plan</td>
<td>188.36</td>
<td>37.21</td>
<td>225.57</td>
</tr>
<tr>
<td>7. Annual Plan</td>
<td>90.18</td>
<td>13.89</td>
<td>104.07</td>
</tr>
<tr>
<td>8. Annual Plan</td>
<td>101.86</td>
<td>16.82</td>
<td>118.68</td>
</tr>
<tr>
<td>9. Sixth Plan</td>
<td>583.78</td>
<td>91.22</td>
<td>675.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1238.00</strong></td>
<td><strong>220.37</strong></td>
<td><strong>1458.37</strong></td>
</tr>
</tbody>
</table>

During the corresponding period of planned development, it is seen from the figures of areas irrigated annually that the area irrigated under canals has shown a steady increase, whereas the area irrigated under tanks has not only not increased but has undergone a decline\textsuperscript{50}.  

---

\textsuperscript{50}
<table>
<thead>
<tr>
<th>Sl No.</th>
<th>During the year</th>
<th>Area irrigated (acres)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Under Canals</td>
<td>Under tanks</td>
</tr>
<tr>
<td>1.</td>
<td>1955-56</td>
<td>381,659</td>
<td>782,300</td>
</tr>
<tr>
<td>2.</td>
<td>1960-61</td>
<td>582,149</td>
<td>848,630</td>
</tr>
<tr>
<td>3.</td>
<td>1965-66</td>
<td>890,188</td>
<td>800,934</td>
</tr>
<tr>
<td>4.</td>
<td>1970-71</td>
<td>1108,277</td>
<td>901,160</td>
</tr>
<tr>
<td>5.</td>
<td>1975-76</td>
<td>1219,040</td>
<td>1025,778</td>
</tr>
<tr>
<td>6.</td>
<td>1980-81</td>
<td>1366,460</td>
<td>909,150</td>
</tr>
<tr>
<td>7.</td>
<td>1985-86</td>
<td>1836,890</td>
<td>604,910</td>
</tr>
<tr>
<td>8.</td>
<td>1987-88</td>
<td>1913,725</td>
<td>695,087</td>
</tr>
</tbody>
</table>

Decline under tank irrigation

During the period 1955-56 to 1987-88, there is an increase of about 400% in the area irrigated under the canals. However, the area irrigated under tanks has declined.

Now let us examine this decline in the area irrigated under tanks.

It is seen that as on 1st April 1989, there were 22,765 tanks (excluding 13,743 tanks with an atchkat (command area) of less than 10 acres each) with an atchkat of 1528,717 acres. As against this, the actual area irrigated under all tanks was only 810,340 acres. Only about 50% of the area (1604,359 acres) under the tanks was under irrigation.\(^{51}\)
On 1st April 1976, there were existing 38,398 tanks with an atchkat of 1503,649 acres under them. (Of these 22,685 tanks with an atchkat of more than 10 acres each had under them an atchkat of 14,26,244 acres). The area irrigated under all these tanks during that year was 1025,777 acres. About 68 per cent of the area was under irrigation.

Even though during the period between 1976 and 1989, a fresh atchkat of 102,543 acres had been added under the category of tanks irrigating 10 acres and more, the area actually under irrigation has declined by about 2 lakh acres.

Another interesting aspect noticed from the Table given below is that out of 22,765 tanks having an atchkat of 10 acres and more, 16,581 tanks with an atchkat of 970,687 acres are located in the districts of old Mysore State. If we add to this 9,254 tanks in this area which have an atchkat of less than 10 acres under each of them, the total atchkat under all these 25,835 tanks is 1027,307 acres. Whereas, the area under irrigation during 1988-89 under these tanks was only 624,717 acres. Only about 60% of the atchkat was under irrigation.

In the remaining ten districts of Karnataka, other than the nine districts of old Mysore State, there were 6,184 tanks with an atchkat of 10 acres and more under each of them and 4,489 tanks with an atchkat of less than 10 acres under each of them. Together these 10,673 tanks had an atchkat of 579,122 acres under them. The area irrigated under all these tanks during 1988-89 was only 185,592 acres. Only about 30 per cent of the atchkat was under irrigation.
<table>
<thead>
<tr>
<th>Sl.</th>
<th>Names of the District</th>
<th>Tanks upto 4 Hectares</th>
<th>Other tanks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>Atchkat</td>
</tr>
<tr>
<td>1.</td>
<td>Bangalore (Rural)</td>
<td>435</td>
<td>1002</td>
</tr>
<tr>
<td>2.</td>
<td>Bangalore (Urban)</td>
<td>98</td>
<td>225</td>
</tr>
<tr>
<td>3.</td>
<td>Belgaum</td>
<td>117</td>
<td>230</td>
</tr>
<tr>
<td>4.</td>
<td>Bellary</td>
<td>42</td>
<td>85</td>
</tr>
<tr>
<td>5.</td>
<td>Bidar</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6.</td>
<td>Bijapur</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>Chikmagalur</td>
<td>1122</td>
<td>1945</td>
</tr>
<tr>
<td>8.</td>
<td>Chitradurga</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>9.</td>
<td>Dakshina Kannada</td>
<td>101</td>
<td>328</td>
</tr>
<tr>
<td>10.</td>
<td>Dharwad</td>
<td>1128</td>
<td>1820</td>
</tr>
<tr>
<td>11.</td>
<td>Gulbarga</td>
<td>76</td>
<td>148</td>
</tr>
<tr>
<td>12.</td>
<td>Hassan</td>
<td>2502</td>
<td>5326</td>
</tr>
<tr>
<td>13.</td>
<td>Kodagu</td>
<td>434</td>
<td>1434</td>
</tr>
<tr>
<td>14.</td>
<td>Kolar</td>
<td>1489</td>
<td>6569</td>
</tr>
<tr>
<td>15.</td>
<td>Mandya</td>
<td>224</td>
<td>509</td>
</tr>
<tr>
<td>16.</td>
<td>Mysore</td>
<td>559</td>
<td>858</td>
</tr>
<tr>
<td>17.</td>
<td>Raichur</td>
<td>332</td>
<td>713</td>
</tr>
<tr>
<td>18.</td>
<td>Shimoga</td>
<td>2376</td>
<td>5332</td>
</tr>
<tr>
<td>19.</td>
<td>Tumkur</td>
<td>441</td>
<td>863</td>
</tr>
<tr>
<td>20.</td>
<td>Uttara Kannada</td>
<td>2258</td>
<td>2851</td>
</tr>
</tbody>
</table>

| Total | 13743 | 30257 | 22765 | 611515 |
|       | (75,642 acres) |       | (1528.717 acres) |   |
Such a large atchkat not being under irrigation, particularly in the northern dry zone of Karnataka could be due to inadequate rainfall in the catchment areas of many tanks. However, the reduction in the storage capacity of the tanks due to silting could also be an important factor.

Need for a watershed study:

Considering the fact that only about 50 per cent of the atchkat under the 36,598 tanks is under irrigation, it is necessary before any fresh works are taken up for construction, that a thorough detailed study is made of all the existing tanks in each watershed.

Drawing up a plan for the rehabilitation of selected tanks, and modernisation of the canal system under them for effective economy in the use of water are necessary. Such a study is all the more necessary, since we are left with very few sites suitable for constructing either small or large storages. Huge investments necessary for constructing new systems is also a limiting factor. With the fast increase in our population, the cultivated area per head is shrinking and even though the area under irrigation has increased, the irrigated area per head has not shown any increase. The following table highlights very clearly these aspects\textsuperscript{54}.
The table clearly indicates that in the two decades from 1961 to 1981, the population in Karnataka has increased by about 57 per cent, whereas the cultivated area has increased only by 8 per cent. The irrigated area, however, has gone up by about 58 per cent. In other words, if we have been able to feed an increased population it is essentially due to the increase in the area brought under irrigation. In view of the rapid pace with which the population is increasing and the problems encountered in the construction and development of major irrigation projects and the canals under them, it is necessary to galvanise all our resources to rehabilitate the existing old tanks and economise in the water usage under them.

Notes and References

1. *Memoirs of Mysore* - 1799 - A manuscript preserved at the Karnataka Archives, Bangalore. It is presumed that these are the Memoirs of the survey conducted by Col. Mackenzie.

3. Paragraph No.35 of the letter dated 19th November 1866 from Major R.H. Sankey, Chief Engineer of Mysore to the Secretary to the Commissioner for the Government of the Territories of His Highness the Rajah of Mysore.

4. Paragraph No.12 of Ibid.

5. Statement B of Note No.6 enclosed to letter No.67 I dated 4.3.1871 from the Chief Commissioner, Mysore to the Secretary to the Government of India, Public Works Department, Calcutta.

5a. Address of Dewan Seshadri Iyer to Representative Assembly of Mysore on 1-10-1884.


8. Note No.3 enclosed to letter No.67 I dated 4.3.1871, *op cit.*

9. *Administration Report of Mysore* for the period 1886-87 to 1890-91.

10. In the Table, in Appendix 12, a) the areas for 1881-82, 1883-84, 1884-85 and 1885-86 are excluding the figures for Tumkur district; b) the areas for 1880-81 to 1890-91 are from the *Administration Report of Mysore* for the period 1886-87 to 1890-91; c) the areas for 1891-92 to 1894-95 are from the *Administration Report of Mysore* for the period 1891-92 to 1894-95; and the areas for the period from 1905-06 to 1950-51 are from the Annual Crop and Season Reports of Mysore.

12. Statement A of Note No.1 enclosed to letter dated 4.3.1871. See footnote 5 above

13. Statement B of Ibid.

14. Note No.3 enclosed to Ibid.

15. *Administration Report of Mysore* for the period 1886-87 to 1890-91.


17. Paragraph 4 of the letter dated 19th November 1866 from Major R.H. Sankey, Chief Engineer, Mysore, see footnote 3 above

18. Paragraph 12 of Ibid.

19. Paragraphs 46 to 53 of Ibid.

20. Paragraph 3 of Note No.6 enclosed to letter No.67 I dated 4.3.1871 from the Chief Commissioner, Mysore, see footnote 5 above

21. Paragraph 5 of Ibid.

22. Paragraph 8 of Ibid.

23. Address of Dewan Seshadri Iyer to the Representative Assembly of Mysore on 1.10.1884.


28. *Ibid.*, Table No.VIII - p.393

29. *SII XV* - Part II No. 57.


37. *SII IX i* No. 59.

38. *SII IX i* No. 187.


43. Hyderabad District Gazetteers - Vol 1340-1345 Fasli (1931-36A.D. Table XIV - Agriculture - figures given in Gazetteer are for the entire district. The details for taluks Udgir, Ahmedpur, Nilanga, Zahirabad and Narayankhed which are not now in Karnataka have been omitted and the areas for Karnataka are calculated).

44. Report on Minor Irrigation Works in Mysore State - Committee on Plan Projects - 1959 - p.2. (The area under tanks differs widely from the figures for the period 1955-56. But the Crop and Season Report of Mysore for 1956-57 also indicates almost the same area (324 acres). Hence accepted).


46. Manual of South Canara district - 1894, p 197


49. Public Investment in Irrigation in Karnataka - Planning Dept. - Govt. of Karnataka - April 1987 - p.25.


Areas for the years 1975-76, 1980-81, 1985-86 and 1987-88 are as obtained from Season and Crop Reports published by the Director of Statistics.

