State of India's Rivers

for

India Rivers Week, 2016

AHDHRA PRADESH & TELANGANA

Author

Dr. Umå Måheshwari

Contents

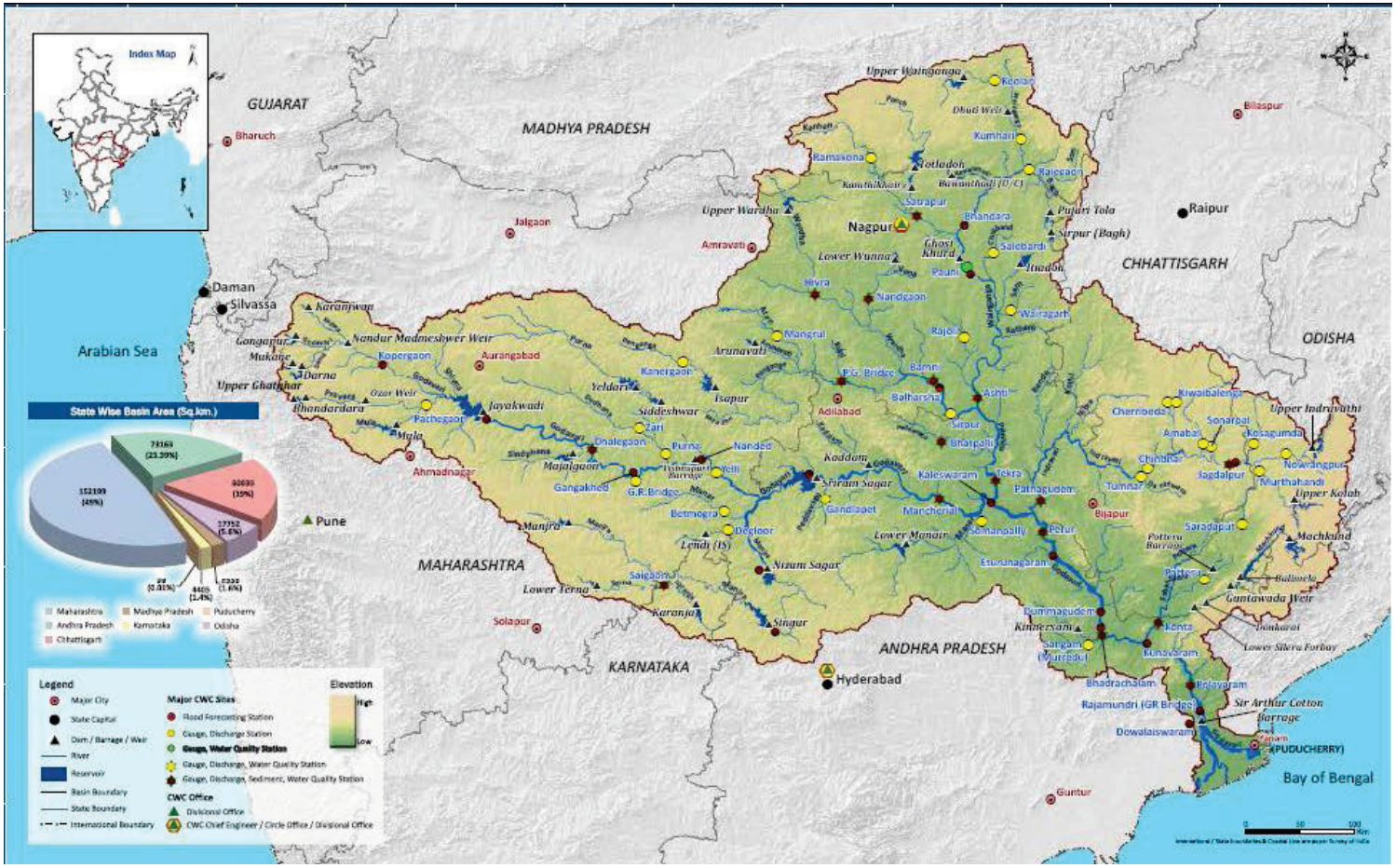
Maps

Tables

1. Major Basin

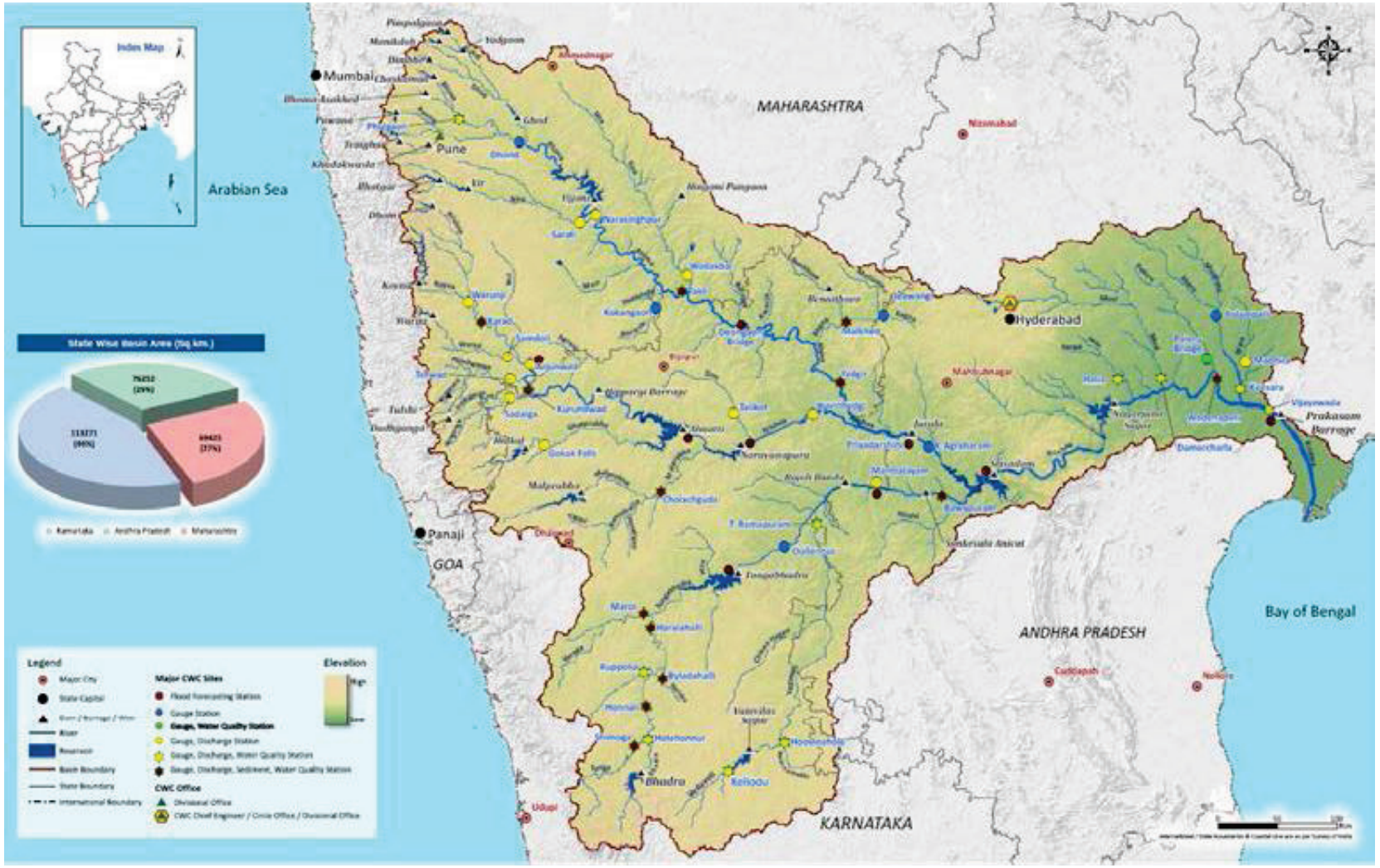
Major Basin in Telangana and Andhra Pradesh are Godavari Basin, Krishna Basin and Pennar Basin.

1.1 Godavari Basin



Map No 1: Godavari Basin

1.2 Krishna Basin



Map No 2: Krishna Basin

1.3 Penaar Basin

Map No 3: Pennar Basin

2. Introduction

This is about two states, Andhra Pradesh and Telangana (the latter being 29th Indian state formed in 2013 after a protracted struggle). Since the discussion is on the state of rivers, it may be noted that these are two states whose historical trajectory is intrinsically linked to the history of, mainly, two major rivers—Krishna and Godavari, although the two states have many other rivers. Furthermore, the new state (and old region and what was once the Hyderabad state), Telangana, was created after many years of struggle and out of one basic river-water discourse: over the utilisation of Godavari river and unequal development of the Godavari delta region vis-à-vis Telangana on account of the numerous irrigation projects and hydro-power projects commissioned and implemented in the coastal Andhra region (now in AP state), besides several later projects commissioned for the Rayalaseema region, to which the former Chief Minister of AP, Dr. Y.S. Rajasekhara Reddy belonged. In the wake of the recent contention between Telangana and Andhra Pradesh and the resolution over utilisation of the other river, Krishna, the state of rivers in Andhra Pradesh cannot be seen without addressing the same in Telangana, which have a historical trajectory that necessitates an understanding of the two states together while discussing rivers.

The Godavari deltaic belt was part of the Madras Presidency during the colonial rule. Both Andhra Pradesh and Telangana, interestingly, were states created post-independence—in the 20th and 21st century. Andhra Pradesh was created in the year 1956, following a popular agitation, and quickened by the fast unto death of Potti Sreeramulu. Though the Telangana statehood agitation followed soon, in the 1960s, and reached its peak in 1969-70, with the Congress at the Centre promising creation of Telangana (which they backtracked from), it was yet another agitation resumed in 2009 (beginning with yet another indefinite fast by K. Chandrasekhara Rao, the chief of the Telangana Rashtra Samiti) that finally culminated in the creation of the Telangana state (not without its share of uncertainties) on 2nd June, year 2013.

In the backdrop of its creation lies an important, related, decision, over the river Godavari—the declaration of the Indira Sagar Polavaram dam as a National Project and merging of erstwhile Telangana region district is with the new state of Andhra Pradesh, in order to carry on with the multi-purpose dam project (involving submergence of officially 276 villages, nearly 80 per cent tribal villages, and a pristine semi-deciduous, semi-evergreen forest land of more than three thousand hectares and displacement of more than three hundred thousand people) to avoid any inter-state legal battle over the submergence. Hence, in the very emergence of these two states lies a state of one major river, Godavari. To some extent, this report looks at the politics over rivers and the contemporary development paradigm, involving construction of hydro-electric projects and

several subsidiary projects using rivers, as one of the major threats to the life of rivers. These projects also add to pollution, displacement, protracted battles, sometimes involving violence, such as the one we are witnessing over Cauvery river between Karnataka and Tamil Nadu, where even Tribunals seem to have failed.

At present, the state of Telangana has been facing opposition from people on the issue of the Mallannasagar project and land acquisition for the same. Though in this case, the arguments range from opposition to the project, per se, the louder discourse has been one of 'adequate compensation' for the farmers whose lands are being acquired by the government, and in the latter case, the state government has got the upper hand in that it has now agreed to increase the compensation based on the new land acquisition (Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013). At another level, the state government has been seeking National Project tag for the Kaleswaram project, an irrigation project. The state government has already formed a Kaleswaram Irrigation Corporation to raise funds for the project which is estimated at Rs. 80,000 crore. If this becomes a National Project, it reduces the financial burden on the state. The project aims to irrigate 18.2 lakh acres in Adilabad, Nizamabad, Karimnagar, Warangal, Nalgonda and Ranga Reddy districts. It will stabilise an additional 11.8 lakh acres of existing ayacut and will divert 30 tmc ft water to meet the demands of Hyderabad, 10 tmc ft for villages en route and 16 tmc ft for industrial needs.

At the Apex Council Meeting organised under the aegis of the Union Ministry of Water Resources on 21st September 2016, the two states were called to settle the disputes over water sharing between AP and Telangana.

AP has opposed the two projects being taken up by Telangana, namely, Dindi Lift irrigation (which will make use of 30 tmc ft of Krishna water) and Palamuru-Rangareddy lift irrigation project (70 tmc ft of Krishna water), which, it claims, violate the State Reorganisation Act. Telangana's has complained against diversion of about 70 tmc ft (so far) of unaccounted for water from Pothireddypadu (Srisailam foreshores) and diversion of Godavari water to Krishna basin by AP and seeks 90 tmc ft of assured water (as per the Bachawat award in the Godavari Water Disputes Tribunal) in lieu of Polavaram and Pattiseema projects. AP has problems with excess utilisation of water by Telangana from Jurala. Telangana and AP have agreed on—joint committee for assessing utilisation of water in all projects of the two states; the Krishna Water Disputes Tribunal will be asked to submit its report as early as possible. The tribunal report will be binding on each state, irrespective of the number of the projects each of them constructed; installing telemetry devices for

measuring inflow and outflow at different locations in projects. They should be set up in two to three months; expert committee to be reconstituted in view of the complaint lodged by Telangana about neutrality of the chairman and a member; the states should adhere to the award of GWDT to compensate to Telangana 45tmc ft water above Nagarjunasagar for diversion of water by AP from Godavari to Krishna basin.

The Reorganisation Act had set up the Godavari River Management Board and Krishna River Management Board. The GWDT, in connection with the Polavaram project, fixed a share of 14 tmc ft for Maharashtra, 21 tmc ft for Karnataka and 45 tmc ft for former AP for utilisation above Nagarjunasagar to displace discharges for Krishna delta. Srisailam left bank canal in Nalgonda was designed with 30 tmc ft out of the 45 tmc ft water. Telangana contends that there was delay in allocation of water to Telangana and that it was not consulted in the constitution of expert committee to frame guidelines for fixing jurisdiction of projects and diversion of water from Godavari to Krishna. (See: The Hindu, 21st and 22 September, dateline, Hyderabad)

It is important to note that the current development politics is the most crucial threat to rivers in terms of the nature of development proposed for the country. These inter-state conflicts, to a large extent, emerge from the very same developmental politics where each state wants to be one-up in attracting investments and infrastructure, and get the latest town or city in its boundaries within the Smart City project. I have compiled a list of disputes – pertaining to Telangana and Andhra Pradesh and other states on rivers common to them, because to a great extent the conflicts arise out of perceived inequality in access to river waters, and consecutive building of projects across the rivers and water bodies. The present state of development is fixated upon maximum use of river waters and any obstructions imposed on the river's flow means to take away from its basic principle: flow. This paradigm is irrespective of the political parties that may rule different states and has more to do with an idea of progress and control of natural resources, including rivers. One of the important facts about Andhra Pradesh, before it became Telangana and AP, is the number of hydro power projects and irrigation projects that have been built since AP was formed in 1956.

Ramaswamy Iyer notes in one of his writings, that

> *'A persistent myth is that hydroelectric power is environmentally 'benign' because (unlike thermal power) it does not generate Carbon Dioxide (CO2). However, it has other adverse impacts…It may create a series of dry patches in a river. Besides, the intermittent flow of waters through the turbines in response to the varying market demand for power creates huge 'diurnal' variations in river flows: the range could be 0-400 per cent of the flow. (There is one instance in which the river flow is*

> *virtually zero for 20 hours in the day when the turbines are not operating, but in the remaining 4 hours, when the power plant operates to meet peak demand, and the water held in pondage is let out through the turbines into the river channel, the river runs 8 m high for 4 hours.) Aquatic life, vegetation, and river-dependent communities have learnt to adapt themselves to periodical natural variations in river flows, but they simply cannot cope with huge diurnal variations of the order mentioned. (Further, the stilling of moving waters in a reservoir has serious impacts on river morphology and water quality, may result in eutrophication, and may also generate greenhouse gases by emanation from submerged organic matter. These effects will, of course, vary from project to project and need study, but tend to be overlooked because of the repeated assertion that hydropower is 'clean' power.)' (Living Rivers, Dying Rivers, 2015, pp.438-439)*

He also writes,

> *'The engineer also talks about 'river training works'. The analogy here seems to be that of a pet dog, or cat, or a circus animal t o be trained by human beings. The hubris involved in talking about 'training' a river does not seem to shock people.' (Iyer, 2015, p. 437)*
>
> *'Engineers also talk about 'river development' or 'water resource development'. This carries the same kind of Promethean, hubristic, manipulative connotation as the term 'river training' ...' (Ibid, p.440)*

This report will also have elements seen as common threats to rivers, such as pollution, and there are a few facts and figures which give information about the health of rivers from these parameters. But it is also important to look at the disputes over water sharing because they lead to or are preceded by projects which invariably lead to deteriorating health of the river system as a whole, not in terms of one single river, with a singular name, but the entire interconnectedness of several streams, rivulets, tributaries that give the identity to a large river, where each of these components of a river are equally important: their individual health in a particular political boundary of a state is crucial for the health of the larger / major river. And some projects promise to threaten the very flow of a river or divert its natural course, which means they impact at some level on the river system.

Following is a list of rivers in AP and Telangana states, as listed on web sources, such as Wikipedia and the websites of the respective state governments.

3. Rivers of Andhra Pradesh and Telangana

Table 1: List of river in Andhra Pradesh and Telangana

Sl.No	Rivers of Andhra Pradesh	Sl.No	Rivers of Telangana
1	Arani	1	Godavari
2	Bendi Gedda	2	Krishna
3	Borramma Gedda	3	Maner
4	Budameru	4	Pranahita
5	Budameru	5	Munneru
6	Bahuda	6	Manjira
7	Champavati	7	Musi
8	Cheyyeru	8	Palar
9	Chitravati	9	Tungabhadra
10	Galeru	10	Bhima
11	Garibula	11	Penganga
12	Gedda	12	Wardha
13	Godavari	13	Dindi
14	Gundlakamma	14	Taliperu
15	Jhanjavati		
16	Kandaleru		
17	Kandivalasa		
18	Kalangi		
19	Kinerasani		
20	Koringa (or Coringa)		
21	Krishna		
22	Kundu		
23	Mahendratanaya		
24	Madala		
25	Maldevi		
26	Manneru		
27	Murredu		
28	Nadari		
29	Nagari		
30	Nagavalli		
31	Narava Gedda		
32	Palar		
33	Paleru		

34	Papagni		
35	Pedda Gedda		
36	Peddavagu		
37	Penna / Pennar		
38	Ponnaiyar		
39	Sabari		
40	Sileru		
41	Sarada		
42	Swarnamukhi		
43	Tammileru		
44	Tandava		
45	Tungabhadra		
46	Vamsadhara		
47	Varaha		
40	Vedavathi		
49	Yeleru		
50	Yerrakaluva		

Many of these are names may not ring a bell in mainstream debates on river waters, because the focus tends to be on the 'major' rivers of a state. A holistic understanding of threat to rivers in the country can perhaps come about if each of such rivers, even the unknown ones, or streams or lakes, are taken up for individual study or if their histories are studied, in connection with the people, places, the nature of development in areas where these are located.

4. Irrigation and hydropower Projects

Some Old and New Projects on Rivers (irrigation and hydropower) in Andhra Pradesh and Telangana (Source: http://india-wris.nrsc.gov.in/wrpinfo/index.php)

- **Ahobilam / Penna Ahobilam (Dr. K.S.P.A.B.R.) Dam** – 1994 – Pennar - Rayadurg - Pennar – in Anantapur - Hydroelectric, Irrigation
- **Donkarai (S.H.E.S)** – 1983 – Sileru – Malkangir – Godavari – Malkangiri - Hydroelectric, Irrigation
- **Forebay Lower Sileru (S.H.E.S) Dam** – 1978 - Sileru - Bhadrachalam – Godavari – Khammam - Hydroelectric, Irrigation
- **Pulichintala** – Huzurnagar- Krishna – Nalgonda - Hydroelectric, Irrigation
- **Vottigadda Dam** – 1976 – Nagavalli—Parvathipuram-East flowing rivers between Mahanadi and Pennar –Vizianagaram- Hydroelectric, Irrigation

- **Jalleru Dam** – 1992 - Jalleru-Polavaram-East flowing rivers between Mahanadi and Pennar-West Godavari-Irrigation
- **Kovvadakaluva Dam** – 2004 - Kovvada kaluva – Polavaram – Godavari - West Godavari-Irrigation
- **Polavaram Dam**-2005 onwards – Godavari - Hydroelectric, Irrigation, Industrial Water Supply (multipurpose)

5. Inter-State projects

(Source: http://www.india-wris.nrsc.gov.in/wrpinfo/index.php?title=Inter_State_Projects)

1. ***Tungabhadra Interstate Project (Andhra Pradesh and Karnataka):-***
   a) Tungabhadra High Level Canal Stage I Irrigation Project-Andhra Pradesh
   b) Tungabhadra Left Bank Canal & Dam Major Irrigation Project
   c) Tungabhadra Low Level Right Bank Canal Major Irrigation Project-Andhra Pradesh
   d) Tungabhadra Right Bank High Level Canal Major Irrigation Project-Karnataka
   e) Tungabhadra Right Bank Low Level Canal Major Irrigation Project-Karnataka
2. ***Tungabhadra Hydroelectric Project (Andhra Pradesh and Karnataka):-***
   a) Tungabhadra Hydroelectric Project
3. ***Machkund Hydroelectric Project (Andhra Pradesh and Odisha)***
   a) Machkund Hydroelectric Project
4. ***Rajolibanda Interstate Project (Andhra Pradesh, Karnataka and Telangana)***
   a) Rajolibanda Irrigation Project
   b) Rajolibanda Irrigation Project-Karnataka
   c) Rajolibanda Irrigation Project-Telangana
5. ***J. Chokka Rao Lift Irrigation Scheme - GLIS Stage-I, II, III Major Irrigation Project (Andhra Pradesh and Telangana)***
   a) Jclis - Glis St-I, II, III Major Irrigation Project-Andhra Pradesh
   b) Jclis - Glis St-I, II, III Major Irrigation Project-Telangana
6. ***Nagarjunasagar Hydroelectric Project (Andhra Pradesh and Telangana)***
   a) Nagarjunasagar Hydroelectric Project
7. ***Srisailam Hydroelectric Project (Andhra Pradesh and Telangana)***

a) Srisailam Hydroelectric Project

6. Multipurpose projects

(Source: http://www.india-wris.nrsc.gov.in/wrpinfo/index.php?title=Multi_Purpose_Projects)

1. ***Sriram Sagar Multi Purpose Project***

a) Ali Sagar Lift Irrigation Project
b) FFC from SRSP (Indiramma Flood Flow canal)
c) Guthpa (Argul Rajaram) Lift Irrigation Project
d) Kaddam Narayan Reddy Major Irrigation Project
e) Pochampad Hydroelectric Project
f) SRSP - II Major Irrigation Project
g) Sriram Sagar Stage – I (Pochampad) Major Irrigation Project

Note: Strangely, there is no mention on this website of Polavaram dam, which I add below:

Indira Sagar Polavaram Dam National Project (multipurpose) – Andhra Pradesh, Telangana, Implications on Odisha and Chhattisgarh.

There are apparently around 95 major and medium irrigation projects ongoing, completed, on Pennar, Godavari and Krishna. There are 161 dams on Godavari and Krishna, 61 major and medium irrigation projects and 24 lift stations on both these rivers.

Thus, with so many rivers, river systems, projects, a detailed study of all the rivers must be done at some point in order to truly assess the state of rivers. Also, the state of politics over rivers is increasingly the most significant intervention in river systems.

This report does not claim to be (and cannot be) a comprehensive study of all the rivers of AP and Telangana, which is not possible in a short time span. It is just a compilation based on some parameters, over just a few rivers. One truly believes that a Red List of endangered rivers, a highly useful exercise, can only emerge through if river systems are studied in their entirety, through deeper field-level engagement—since what happens to and around and in rivers does not actually come out through official data, such as annual reports or lab studies alone. The actual conflicts are based on the ground and many a times even reports such as the CPCB of 2015, fail to make note of important political and economic changes happening in the country, especially on river interventions.

Inter-state riparian issues should be seen as a major challenge as well, because each state expresses a political ownership over the river stretch flowing through its political boundary, without realising that the river knows no such boundaries, since it is interconnected with several streams, tributaries and rivulets and a change in one dimension of it can bring about change in the health of the entire system. But unfortunately the only way the state sees interconnection is through a plastic application of river interlinking, diverting water through turbines and technology of totally unconnected basins (naturally unconnected that is). If a river's flow is stopped at one end, that itself serves as a threat to a living river. Hence it was important to highlight the existing (few of) water disputes, political disputes over expression of ownership over one stretch of a river. If all these rivers and the changes affected in them could be studied at some point it would be a significant exercise. There are also mining activities, which affect the rive system directly or indirectly, which need to be taken into consideration. Interestingly, the Telangana state government has now come up with a regulation in 2014 on sand-mining a activity which includes installation of CCTV cameras and more severe penalties for unregulated sand-mining.

The report has these main components: Rivers, River Basins (details); Disputes over Rivers (inter-state); Pollution (based on some of the official data) in Rivers, pertaining to Telangana and Andhra Pradesh. Mythology of rivers has been left out since in today's time and date, there are several websites listing the most mainstream of these and it might be a good idea to try and look at the more everyday and perhaps also non-Sanskritic mythologies of the marginalised communities for river stories, which was not possible in a short time span, without field-based documentation. One mentions some ritualistic associations, where relevant, regarding the rivers.

7. Basic Facts

7.1 Telangana – Basic Facts

The state has an area of 1, 14,840 Sq Km and has a population of 3, 52, 86,757. Hyderabad is its capital – meant to be a joint capital of AP and Telangana for ten years from the year the new state was formed. But Andhra Pradesh government has already acquired thousands of acres of land and commenced the building of a new capital city, called Amaravati in the Krishna region. Agriculture has been largely the mainstay of Telangana with most farmers depending on rain-fed cultivation, besides an extensive coverage of borewells in many farmlands, as well. Both Godavari and Krishna flow through this state, besides other rivers. Paddy, cotton, sugarcane, oilseeds, millets and mango are some of the more widely grown crops. Horticulture and floriculture have also been promoted in recent years in the state. Telangana has more than 60 Special Economic Zones (SEZ).

7.2 Andhra Pradesh – Basic Facts

In regional terms, Rayalaseema is also part of the new AP state. Paddy, sugarcane, groundnut, tobacco are some of the main crops grown in AP. Floriculture and horticulture are also important activities in farmlands of the Godavari delta region. Some of the important birding areas in the state are the water bodies - Kolleru and Pulicat lakes, the former between Godavari and Krishna rivers.

The Polavaram multipurpose National Project is a mighty big dam project in this state which commenced in year 2005, and has a unique record of sorts for the number of violations it has managed in the course of construction and continued in spite of several petitions and protests all these years, and in spite of the opposition stated by the Odisha and Chhattisgarh governments early on regarding submergence in those states. It was the pet project of the former CM of united AP, Dr. Y.S. Rajasekhara Reddy.

8. Major Rivers and River Basins

8.1 Godavari River

The Godavari river is the largest of the peninsular rivers. The catchment of the river is 3, 12, 812 sq. kms (1, 20, 777 sq.miles) and spread across six states: Maharashtra (where the source of the river is located atop a hill in Trimbak / Triambak); Karnataka, Telangana Chhattisgarh, Odisha and Andhra Pradesh. The river joins the Bay of Bengal after feeding the Mangroves of the estuary at the south eastern coast, where it branches into two streams, Vasistha and Gautami Godavari before meeting the sea.

The Godavari basin lies between latitude $16^0 16'$ N and $23^0 43'$N and longitudes $73^0 26'$ to $83^0 07'$E. The basin extends over an area of 312,812 km^2, which is nearly 10% of the total geographical area of the country. A total number of 25 water quality stations covering Andhra Pradesh, Chhattisgarh, Karnataka, Madhya Pradesh, Maharashtra & Odisha states are under Godavari Basin.

Godavari has an amazing journey and touches a diverse topography all through its course, being fed and nurtured by several rivulets, streams and rivers (in their own right) en-route, which makes a point about how a river is an entire system, where the constituent parts are as important as the main river that she becomes, before joining the sea. Perhaps each of these water sources has their own mythologies, cultural connections with people and histories, cultural and context-specific. In its long south-eastern journey from its source, Godavari receives waters mainly from Pravara, Mula, Purna, Dudhna, Wardha, Painganga and Wainganga united in Pranahita, Indravati and Sabari. The

largest tributary of the Godavari is the Pranahita with about 34.9% coverage of drainage area. The Pravara, Manjira and Maner are right bank tributaries covering about 16.1%, the Purna, Pranahita, Indravati and Sabari are important left bank tributaries, covering nearly 59.7% of the total catchment area of the basin. The Godavari basin as whole receives 84% of the annual rainfall on an average, during the southwest monsoon, between mid-June and late August. The Godavari basin has rich forest and mineral wealth. The principal minerals found are Bauxite, Manganese, Iron ore and Coal. Other minerals like lead, zinc, corundum, refractory minerals and kaolin are also found in small quantities in different parts of the basin. Two major (and historically, as well as politically significant) projects on river Godavari are located at mile 852 of the river (Cotton Barrage / Dowlaiswaram Barrage) and at mile 829, the Polavaram project; the former is a colonial period legacy and the latter, a present-day predicament.

Some of the important irrigation projects (old and new) in the Godavari basin are: Sriram Sagar and Kaddam Major Irrigation Project and 13 Medium Irrigation Projects of Andhra Pradesh are in the catchment area of Godavari Basin. The Wainganga Canal and Sarathi System Major Irrigation Projects and 17 Medium Irrigation Projects of Madhya Pradesh are also in the catchment area of Godavari Basin. The Kodwa, Godavari (Darna), Pravara, Purna, Girna, Pus, Gangapur Stage-I & II, Bagh Pench, Kalisara and Mula Major Projects and 129 Medium Irrigation Projects of Maharashtra are in the catchment area of Godavari Basin. There are several prominent Major Irrigation Projects like Waghed, Ozarkhed, Karanjawan, Pallakhed and Madmeswar, Jayakwadi Stage-1, Bhandaradara, Maner, Adhole, SRS Projects Stage-I, Nizamsagar, Lower Maner, Maner Project, Manjira, Dhuti weir, Cotton Barrage, Puma and Lakhnavaram are also in the catchment areas of the river basin. There are three Medium Irrigation Projects of Chhattisgarh also in the catchment areas of the river basin.

During the colonial rule, this river gave its name to an entire districts that covered the delta region in its entirety and part of the reason was the Godavari anicut, or the Dowlaiswaram barrage or the Sir Arthur Cotton barrage, which besides being the first major colonial reservoir built in this region, also happened to have brought with it, an entire administrative mechanism around Godavari river and its ‘utilisation’ for purposes of irrigation and navigation (latter, to a limited extent, since Arthur Cotton’s grandiose plan of building a country-wide navigation project connecting different rivers did not take off, but which has come back to haunt us in the form of the river interlinking project of the Indian state, irrespective of the political party holding the reins at the centre). Godavari river holds a very deep link to the history of Andhra Pradesh and Telangana.

It terms of etymology, the colonial Gazetteer of Godavari District (1915) records the purely Sanskritic (and hence not to be seen as the only mythology that exists, perhaps there are many other stories, of non-Sanskritic origins which have usually not been recorded) context:

> *'Rai Bahadur V. Venkayya, M.A., the Government Epigraphist, considers that the word [Godavari] means, literally either, 'streams giving wate' (sometimes in old writings abbreviated to Goda or 'giving water') or 'streams giving kine'. Another Sanskrit authority, interprets the word in a somewhat similar way as meaning 'the best (vari) [of those that] give water; and adds the alternative 'the chief [of those that] give heaven' with reference to the sanctifying power of the river. The local and popular etymology of the name says that it means 'the expiation for killing a cow', and a well-known story relates how the rishi Gautama brought the Godavari to the district to expiate the sin of having killed a cow in a moment of anger. Kovvur in Yernagudem taluk, Kistna district, the name of which is said to mean 'the village of the cow'Kovvur in Yernagudem taluk , Kistna district, the name of which is said to mean 'the village of the cow' , is pointed out as the place where the cow was slain and the water was first made to flow. (Gazetteer, Godavari District, 1915, p. 3)*

> *'Seven traditional mouths are recognised as sacred by Hindus. The holy waters of the Godavari are said to have been brought from the head of Siva by the saint Gautama, and the seven branches by which it is traditionally supposed to have reached the sea are said to have been made by seven great rishis. The mouths of these are considered especially holy and to bathe in the sea at any one of them is considered an act of great religious efficacy. It is customary for the pious (especially childless persons desirous of offspring) to make a pilgrimage to each in turn and bathe there; thus performing the sapta-sagar-yatra or 'pilgrimage of the seven confluences'... The traditional seven are the Kasyapa or Tulya (the Tulya Bhaga drain), the Atri (the Coringa river), the Gautami, the Bharadvaja, the Visvamitra or Kausika, the Jamadagni and the Vasistha. The Bharadvaja, Visvamitra and Jamadagni no longer exist; but pilgrims bathe in the sea at the spots where they are supposed to have been.' (Ibid, p.6)*

The colonial gazetteer also notes that Godavari river, "runs nearly across the peninsula, its course is 900 miles long, and it receives drainage from 115,000 square miles, an area greater than that of England and Scotland combined. Its maximum discharge is calculated to be one and a half million cubic feet per second, more than 200 times that of the Thames at Staines and about three times that of the Nile at Cairo." (Ibid., p. 4)

Godavari river has its once in 12 year cycle of Godavari Pushkaram or Godavari Pushkaralu, during which time the river is said to be at its purest and people take a dip in the waters at different ghats set up for the purpose along the river's course. The event is as revered as the Kumbh in the north.

There is one belief that in this period other rivers too cleanse themselves of their sins in Godavari. The last Godavari pushkaram happened in 2015.

8.2 Krishna Basin

The Krishna basin lies between north latitude 13^{0}07' to 19^{0}20' and east longitudes 73^{0}22' to 81^{0}10'. The basin extends over an area of 258,948 km^{2} ((99, 980 sq miles), which is nearly 8% of the total geographical area of the country. 24 water quality stations covering Andhra Pradesh, Karnataka and Maharashtra states are under Krishna Basin. The Krishna basin covers Maharashtra, Karnataka, Telangana and Andhra Pradesh states.

The source of Krishna, or Krishnaveni river (as it is also referred to in Andhra Pradesh and Telangana) is in the Western Ghats at an altitude of 1337 m, just north of Mahabaleshwar. The river flows eastwards, through the four states mentioned above, finally joining the Bay of Bengal, spanning a total length of about 1,400 km. Together with its tributaries, the river drains about 708 km of the Western Ghats, which is its chief source of supply. Agriculture is the predominant land use in the Krishna basin. Among the rivers that feed Krishna are the Koyna (west of Mahabaleshwar hills), Yerla, Varna, Panchganga, Dudhganga, Ghataprabha and Malaprabha (with sources in the Western Ghats) and as it flows down, it is joined by Bhima, Tungabhadra, Dindi, Musi, Palleru and Munneru. The important minerals found in the catchment are gold, bauxite, lime stone, iron ore, manganese ore, quartz, copper, red oxide, soapstone, etc.

Officially, since the water availability in the Krishna river was said to be inadequate to meet the demand of irrigation of Krishna delta farmlands, the Godavari river has been linked to Krishna through the Polavaram Right Bank Canal with the help of Pattiseema Lift scheme. The project was commissioned in 2015 and recently the Chief Minister of AP, Chandrababu Naidu had a symbolic inauguration of the interlinking of these two rivers. The diversion is expected to augment water availability in Prakasam Barrage in AP, the canals of which are part of the National Waterway 4.

Like other rivers, this river is also held as sacred and a bath in this river is believed to cleanse people of their sins. Here, too, the Krishna Pushkaralu are held once in 12 years at different ghats, and this year, the event was celebrated in Andhra Pradesh and Telangana, starting on 12 August and ending on 23 August. The period, in the traditional calendar, is observed for 12 days, from the time Jupiter enters Virgo (*kanya rasi)*. This is the period of the ritual cleansing of both the river and the people. The different ghats in Andhra Pradesh set up for this purpose were as follows:

- **Vijayawada:** Padmavathi Ghat, Krishnaveni Ghat, Durga Ghat, Sithanagaram Ghat, Punnami Ghat, Bhavani Ghat, Pavithra Sangam (Ferry) Ghat.
- **Amaravathi:** Shivalayam Ghat, Dhyana Buddha Ghat, Dharanikota Ghat
- **Kurnool District:** Patala Ganga Ghat (Srisailam), Sangameswaram River Ghat
- **Karnataka:** Chikodi (Bagalkot), Raichur (Krishna Taluk)

9. Pushkaralu and Pollution

Interestingly, the **Telangana State PCB** had the following details of pollution levels during the Krishna pushkaram in Telangana state recorded from the **ghats set up in Telangana**, which were as follows:-

Table 2: Water Quality Parameter in Krishna River

Name	**pH**	**Total Dissolved Solids** (mg/l)	**F. Coli (as on 21-08-2016)** (ml)	**E. Conductivity** (µmho/cm)	**Dissolved Oxygen** (mg/l)	**T. Coli**
Nandi agraharam	8.40	265.00	10 MPN/100	520.00	4.20	4946 MPN/100 m
Beechpally	8.20	240.00	5 MPN/100	478.00	4.00	4550
Alampur	8.3	182.00	8 MPN/100	362.00	4.50	3650
Srisailam – pathala ganga	8.10	148.00	6 MPN/100	310.00	5.10	3614 MPN/100 ml
Nagarjunasagar	8.30	409.00	7 MPN/100	716.00	4.80	4921
Wadapally	8.40		6 MPN/100	711.00	7.40	4196
Mattapally	8.50	346.00	25 MPN/100	697.00	7.80	4354

[Source: http://pcb.ybrantdigital.com/Pushkaralu/Home.aspx]

One could not find related data of pollution during the Krishna pushkaram for ghats in Andhra Pradesh.

The last surviving Mangrove forests in the Krishna estuary—the Krishna Wildlife Sanctuary—is home to the large number of resident and migratory birds. Fishing cat, otter, Estuarine crocodile, spotted deer, sambar, black buck, snake, lizards and jackal, etc are the species specific to this habitat. The sanctuary also supports rich vegetation with plants like Rhizophora, Avicennia and Aegiceros. There are other wildlife sanctuaries too located in the Krishna river basin, and the ones

located within AP-Telangana are: Nagarjunasagar-Srisailam Tiger Reserve; Rollapadu Wildlife Sanctuary (famous for the Jerdon's Courser); Pakhal Wildlife Sanctuary and there is a namesake National Park located in Hyderabad, called the Kasu Bhramananda Reddy National Park (or KBR park), recently in news over the massive tree cutting being taken up by the Telangana state government, which was opposed by many people.

10. Some Inter-State Disputes over River Waters

10.1 Babli / Babhli Barrage

In May 2005—under the Dr. Y.S. Rajasekhara Reddy regime—Andhra Pradesh state took up the issue of the Government of Maharashtra constructing the Babli / Babhli barrage in the reservoir submergence of the Sriram Sagar project, in violation of the Godavari Water Disputes Tribunal award. In response, the Central Water Commission (CWC) held two meetings with both Maharashtra and Andhra Pradesh in attendance that same year. Another meeting, with the Chief Ministers of AP and Maharashtra, was held in April 2006, under the aegis of the Union Ministry of Water Resources, the outcome of which was that a Technical Committee would be set up under a Chairperson or a Senior Officer of the CWC with representatives of both the States to study the details of the Babli / Babhli project and the Committee would be expected to submit a report not later than May 20, 2006. Until that was done, no further construction would be carried out by the Maharashtra government on Babli / Babhli. The Technical Committee held two meetings and did not come out with any report since the AP government had failed to submit detailed proposals as per suggestions made during the meetings. In July 2006 the Government of AP filed a suit against the State of Maharashtra and Union of India and Others under Article 131 of the Constitution, seeking permanent injunction restraining Maharashtra from going ahead with the Babli / Babhli barrage within the reservoir spread of Sriram Sagar Project.

On 26th April, 2007, the Supreme Court passed an interim order stating that while Maharashtra state could proceed with the Babli project, it would not install 13 gates until further orders. Further, "As the state of Maharashtra is permitted to proceed with the construction at its own risk, it will not claim any equity by reason of the construction being carried on by it."

In June, 2009, the Government of AP had this request to make to the Centre, which was shared in a Press Release by the Press Information Officer in Delhi at the then AP Bhavan:

*"**Request to instruct the Government of Maharashtra to stop the construction of 11 barrages intended to utilise over and above their share of water -** The States of Maharashtra and Andhra Pradesh have concluded an agreement on 6.10.1975 over the utilisation of the waters of river Godavari in the basin area above Pochampad Dam. In terms of the said agreement, Maharashtra can use 60 TMC of water for its new Projects above Pochampad Dam. Further, Andhra Pradesh can go ahead with Pochampad Project with FRL+1091 feet and MWL+1093 feet. Pochampad Dam (Sri Rama Sagar Project) was constructed across river Godavari by Andhra Pradesh to cater to the irrigation and drinking water needs of 7 districts of Telangana and Godavari river is the only source of survival for the inhabitants of these districts. Government of Maharashtra is constructing 11 Barrages across river Godavari in between Jaikwadi and Sri Rama Sagar Project. The 11 barrages are (1) Amdura Bandhara (2) Digras Bandhara (3) Muli Bandhara (4) Mudgal Bandhara (5) Dhalegaon Bandhara (6) Loni Swangi Bandhara (7) Raja Takli Bandhara (8) Apegaon Bandhara (9) Jogladevi bandhara (10) Mangrul Bandhara (11) Hirvopuro Bandhara. With the construction of 11 barrages the entire stretch of the Godavari river for about 430 km would turn into a perennial source providing unlimited scope for drawl on both sides, much beyond the planned capacity of 7.20 TMC... Government of Maharashtra is going a head with the construction of 11 barrages at a rapid pace, without responding to the repeated requests from Government of India and Government of Andhra Pradesh. It is therefore requested to instruct the Government of Maharashtra to stop the construction of 11 barrages intended to utilize over and above their share of water." (Umamaheshwari, 2015, p. 237)*

10.2 Vamsadhara River

The Vamsadhara flows between Mahanadi and Godavari. The river originates in Lanjigarh in Kalahandi district of Odisha, flowing 254 km before joining the Bay of Bengal at Kalingapatnam in AP. The catchment area of the river is 10,830 square kilometers. Vamsadhara river basin covers an area of 8015 sq.km in the state of Odisha and 2815 sq.km in Andhra Pradesh.

One of the major tributaries of Vamsadhara River is Mahendratanaya, which originates Gajapati district of Odisha. It joins the main river in the state of Andhra Pradesh, upstream of Gotta barrage.

The Boddepalli Rajagopala Rao Project is located on this river, meant for irrigation to north Andhra through two canals, the Left Main and the Right Main Canal, for irrigation of around 148,000 acres through the RMC and 62, 280 acres through the LMC.

10.3 Vamsadhara Water Dispute

In February 2006, the State of Orissa (it was then called Orissa, now Odisha) filed a complaint against the state of Andhra Pradesh with the Central Government under the Section 3 of the Interstate River Water Disputes Act of 1956 regarding water sharing of Vamsadhara and sought the setting up of an Inter-state Water Disputes Tribunal for adjudication. The main grievance was that

Andhra Pradesh was constructing a flood flow canal at Katragada, off the river Vamsadhara without bothering about the agreements over the inter-state river water sharing. Orissa's contention was that this act of AP would end up drying the river bed and shift the river, thereby affecting groundwater table. Further, it sought a scientific assessment of available water in Vamsadhara at Katragada and Gotta barrage, and sought a basis for water sharing of the available water between the two states. Accordingly, an inter-state meeting was held in New Delhi on April 24, 2006 convened by the Secretary, Water Resources. Both the states agreed upon sharing of the water on 50-50 basis. Both states also agreed to the conduct of an assessment of the water availability in the basin based on the yield statistics until year 2005. Two follow-up meetings were held later that year on the issue, convened by the CWC. Odisha's Writ Petition (No. 443 of 2006) came up for hearing in the Supreme Court in April 2007 but was adjourned; subsequent efforts for negotiations through meetings at the level of the Secretaries of the two states did not lead to any resolution. In February 2009, the Supreme Court directed the Centre to constitute a water disputes tribunal. The Ministry of Water Resources constituted the Vamsadhara Water Disputes Tribunal (VWDT), published in the official Gazette vide notification dated 24.02.2010. The Tribunal delivered its judgment in the I.A. No. 1 of 2010 on 17th December, 2013, allowing the Government of Andhra Pradesh to construct the Side Channel Weir along with the ancillary works as proposed and has, *inter-alia*, directed that a three-member Supervisory Flow Management and Regulation Committee be constituted for Vamsadhara. Meanwhile, the Odisha government filed a SLP No. 3392 of 2014 in the Supreme Court against the order of the Tribunal of 17th December, 2013.

What Happened thereafter?

Vamsadhara Phase-II Will be Completed by 2016-end

(Source:http://www.newindianexpress.com/states/andhra_pradesh/Vamsadhara-Phase-II-Will-be-Completed-by-2016-end/2015/06/15/article2867227.ece)

By Express News Service
Published: 15th June 2015 06:00 AM

SRIKAKULAM: The state government would complete the phase-II works of Vamsadhara project by 2016-end and provide irrigation facility to the agricultural lands under its ayacut. Labour minister K Atchannaidu said that the government would soon announce the relief and rehabilitation package to the project oustees.

Laying a foundation for the Navathala Lift Irrigation scheme in Saravakota mandal here on Sunday, Atchannaidu said that though the previous governments sanctioned Rs 970 crore for the Vamsadhara

Phase-II project, less than 25 per cent works were carried out due to legal hurdles. He said that the government was keen on completing the project at the earliest. "Despite having the Vamsadhara and the Nagavali rivers, Srikakulam district was unable to use these resources and about 300 tmc water is discharged into the sea. We intend to utilise this water to the optimum," he said.

The minister said that the government had sanctioned Rs. 7 crore for revival of about 15 lift irrigation schemes in the district that have been shutdown for various reasons. Further, 15 more lift irrigation schemes in ITDA, Tekkali and Kotabommali mandals have been proposed at a cost of Rs. 300 crore. "We will complete the Thotapalli project works by July and bring about 1.8 lakh acres under cultivation", he added. He had also formally inaugurated the Kasturba School Complex, constructed at a cost of Rs.1.25 crore, at Saravakota on the occasion. Zilla Parishad chairman Dhanalakshmi, MLA B. Ramanamurthy, district collector P. Lakshmi Nrusimham and others were present.

Vamsadhara tribunal order favours A.P

Allows utilisation of 8 tmc of water by constructing side weir near Battili across the river

http://www.thehindu.com/news/cities/Visakhapatnam/vamsadhara-tribunal-order-favours-ap/article5473054.ece

The Vamsadhara Water Disputes Tribunal on Tuesday gave a favourable order to benefit thousands of farmers in Srikakulam district. It has allowed Andhra Pradesh to utilise 8 tmc of water from Vamsadhara with the construction of a side weir near Battili of Bhamini mandal. The side weir draws excess water during floods and diverts the water to Hiramandalam reservoir.

Odisha's Objection

The *Odisha Government is strongly objecting to the construction of the barrage as well as side weir on the ground that a few villages would be submerged in its territory. The tribunal headed by Mukund Sharma visited the disputed sites in April, 2013, and heard the arguments of both the States. Irrigation officials of Andhra Pradesh explained that over 100 tmc of water was flowing into the sea without benefiting the two States. Justice Sharma who promised to find out an early solution gave an order for the construction of side weir.*

District to be benefited

Srikakulam Irrigation Department superintendent engineer B.Rambabu and executive engineer Dola Tirumala Rao told The Hindu that it was a great achievement for the State which would benefit thousands of farmers in the district.

"We will continue to fight in the tribunal for the construction of the barrage since it will benefit the district

immensely. Over 2 lakh farmers can opt even for the second crop with the optimum utilisation of water throughout the year," said Mr. Tirumala Rao.

The State government has already spent Rs.500 crore over the project. However, the contractors stopped the remaining works with Odisha approaching the Supreme Court. The irrigation officials hoped that the works would be taken up with the favourable order given by the tribunal.

10.4 Nagavali River

The Nagavali river lies within the geographical co-ordinates of north latitude 180 10' to 190 44' and east longitudes of 820 53' and 840 05'. It is surrounded by Vamsadhara in the north, Champavati and Peddagedda in the south, Godavari in the west and the Bay of Bengal in the east. It drains parts of the districts of Kalahandi, Rayagada and Koraput of Odisha and Srikakulam, Vizianagaram and Visakhapatnam of Andhra Pradesh state. The total catchment area is 9510 sq km. The Nagavali river originates near the Lakhbahal in Kalahandi district at an elevation of about 1300m. The total length of the river is 256 km out of which the first 161 km is in Odisha and the rest in Andhra Pradesh. The important tributaries are Barha, Baldiya, Satkalnala, Sitagurha, Srikona, Jhanjavati (Odisha-AP), Gumidigedda, Vottigedda, Suvarnamukhi, Vonigedda, Vagavathi and Relligedda (north Andhra).

Thotapally, Narayanapuram and Jhanjavati are the major projects and there is a medium irrigation project in the catchment area of the Nagavali basin. Manganese, quartz, mica, graphite, limestone, bauxite and construction materials are found in abundance in the Basin.

10.5 Pennar River

Pennar, or Penna, rises in the Thenanahesava hill of the Nandidurg range in Karnataka, flowing through Kolar and Tumkur districts of Karnataka and enters Andhra Pradesh in the Hindupur taluk of Anantapur district, running eastwards before draining into the Bay of Bengal near Nellore. It is 597 kilometres long. Its drainage basin is 55,213 km2, of which 6,937 km2 is in Karnataka and 48, 276 km2 in Andhra Pradesh. The river basin lies in the rain shadow region of Eastern Ghats and receives an annual average rainfall of 500 mm. The Basin lies between east longitude 770 04' to 800 10' and north latitude 130 16' to 150 52'. The Somasila is the only major project in the catchment area of the river basin.

There was a colonial agreement on the sharing of the Pennar river waters (1892) and then there is the post-independence Interstate River Water Disputes Act (1956) which now governs the same.

Water from the Krishna river is transferred into the upper Pennar basin 600 m MSL through the Tungabhadra dam located in Karnataka — a joint project of Andhra Pradesh and Karnataka. The low-lands of Pennar basin can be supplied with Krishna river from the Srisailam dam up to 250 m MSL. The estuary of the Penna river extends 7 kilometers upstream from the Bay of Bengal.

11. Krishna Water Disputes Tribunal (KWDT)

The Indian government set up the KWDT in 1969 to resolve the disputes between Karnataka, Maharashtra and Andhra Pradesh over the sharing of the Krishna river waters. KWDT-I was presided over by the Justice R. S. Bachawat of the Supreme Court. The commission gave its final award (KWDT-I) in year 1973, published in the Extraordinary Gazette dated May 31, 1976; the award became binding on the three states. Scheme A of the same pertained to water availability based on 75 per cent dependability. The share of each state – under the total water being 2060 TMC – was fixed as under:

- Maharashtra -560 TMC
- Karnataka - 700 TMC
- Andhra Pradesh- 800 TMC

Besides, each state was allowed to use return flows of 25, 34 and 11 TMC, respectively subject to time-bound usage of allocated water from the total quantum. They were also allowed to use the waters (allocated to them) through projects they planned.

KWDT-II under Justice Brijesh Kumar gave the further verdict on 29th November, 2013 increasing allocations to AP by 4 TMC and reducing allocations to Karnataka. The award also reduced average annual water availability for environmental flows and salt export from 448 to 171 TMC (including 16 TMC continuous environmental flows) and gave additional 277 TMC for the states. The Government of India extended the KWDT-II by two years from 1st August 2014 to look into the fresh terms with the creation of the Telangana state.

The AP Reorganisation Bill, 2014 spoke of setting up of the Krishna and Godavari River Management Boards. And some of the terms were: regulation of supply of water as per the interstate agreements, supply of water to the successor states, appraisals for proposed construction of new projects on rivers or their tributaries, for technical clearance in case of any adverse impacts on the availability of the water allocated to the states, with prior notification in the gazette, etc.

The demands of the Telangana state (now a fourth riparian state in the Krishna river basin) include that the central government should start the process afresh since it was not part of the KWDT-I and

II adjudications. Maharashtra and Karnataka are opposed to it. Water import from rives of Krishna basin is governed by the Clause XIV-B of KWDT-I final order in case riparian states do not come to any agreement.

Andhra Pradesh started transfer of Godavari water through Polavaram Right Bank Canal in Krishna. Telangana is transferring water for Hyderabad from the Singur, Manjeera and Yellampally projects. Telangana state is transferring Godavari water from Sriramsagar and Devadula projects for irrigation in villages in the Krishna basin, besides Pranahita-Chevella and Dummugudam Lift Irrigation projects, which will also transfer water to Krishna basin in Telangana state. Karnataka is constructing projects for transferring Mandovi and Netravati rivers for irrigation in Krishna basin on its side.

Basically, rivers today seem like roads and highways, being constructed as per the whims and political needs of the states without going into the long-term health of the river system or communities and aquatic lives dependent on them.

12. Palar

Palar river originates in Nandi Hills in Kolar district of Karnataka. It flows 93 kilometers in Karnataka, 33 km in Andhra Pradesh and 222 km in Tamil Nadu before merging into Bay of Bengal at Vayalur, 100 kms from Chennai. The river has seven tributaries, Cheyyar being the chief tributary.

12.1 Inter-state aspect

AP government's irrigation dam at Ganeshpuram across Palar near Kuppam initiated the dispute with the farming communities in five districts of northern Tamil Nadu – Vellore, Kanchipuram, Tiruvannamalai, Tiruvallur and Chennai. The CM of Tamil Nadu raised objection to it and referred to the Interstate River Water Disputes Act , 1956, on the point that the upstream riparian should not construct any project (for diverting, storage, etc) affecting the waters of the downstream, without consent from the downstream state.

Incidentally, during the colonial period the agreement over Palar waters were made when the states of AP and Tamil Nadu were in Madras Presidency and the state of Mysore.

13. The KC Canal and Human-made Floods

'The Kurnul-Cuddapah Canal was built between the years 1863 to 1870 by a Dutch company, originally for navigation, but later converted into an irrigation system, built across 305 kms in Kurnul and Cuddapah in Andhra Pradesh. Between 1953 and 1956 lining works were done using Cuddapah slabs. In 1955 the Government of Andhra Pradesh took up renovation of the canal through lining works. In 1997, the Japan Bank for Irrigation Corporation (JBIC) gave financial assistance for what is called the Kurnul-Cuddapah Modernisation Project. Major construction activities were completed by 2005.The entire project area received irrigation and drinking water from 2005. It also included constructing a new anicut at Sunkesula in place of the older one; the Alaganur Balancing Reservoir; repairing aqueducts, bridges, drainage works, etc. The Government spent around Rs. 1100 crores the project with the help of JBIC…[In] course of time, one fine day, while nature took its course as it had done all along, the technical details of 'control' and 'release' took its toll as Kurnul town and other areas downstream faced one of the worst inundation disasters (floods) in October 2009. It was an unprecedented event (not in hundred years, some said). So, what can really be the lessons from all this modernisation and the money spent? That while natural events , like rains filling rivers with water, etc, happen, what turns them into calamities and disasters is politics of 'management' and ostensibly termed 'flood control'…In technical terms, the politics of 'cusecs-control' in between three States, Maharashtra, Karnataka and Andhra Pradesh made people unsuspecting victims of the disaster. This is how in a 'layperson's' view the damage was analysed. Y. Balasavuri of Kakanur (Nandyal mandal) says,

'Karnataka released the Alamatti waters and informed the officials here; for a week they opened the gates there, we lost our fields and crops. Officials at the Srisailam dam kept waiting, while the water levels kept rising; they suddenly released all the water (over the level needed for power generation) into the Pothireddypadu reservoir. The badly-maintained gates of the reservoir could not hold all that water and the backwaters flowed through into the Kundu river which rushed in, causing several breaches and destroying all our lands and so much in its wake. In 1994 we had floods, but the waters stayed for 24 hours and no more. This time it is the officials who have caused this kind of havoc.' (R. Umamaheshwari, 2015: pp.232-233)

[Source: 'River as a Feminine Presence', in Ramaswamy R. Iyer, Ed., *Living Rivers, Dying Rivers,* Oxford University Press, New Delhi, 2015]

14. Godavari Water Disputes Tribunal

The GWDT headed by Justice Bachawat was constituted in April 1969 in the wake of the inter-state dispute over Godavari river between the states (at that point) of Maharashtra, Andhra Pradesh, Orissa, Madhya Pradesh and Karnataka.

'The Godavari and its tributaries cover a total area of 1, 20, 777 square miles and the approximate yield at 75 per cent dependability is 3,000 TMC. To settle the share of each state and to adjudicate any dispute among them, the Government of India constituted the Godavari Water Dispute Tribunal in notification No. S. O. 1421, dated 10th April 1969....After hearing the position taken by the five states on various issues relating to Godavari waters (the Tribunal) advised them to reach bilateral and multilateral agreements on points of disputes and sharing of waters. The riparian states entered into mutual agreements on all the issues during the period from September 1975 to April 1980. The Tribunal (GWDT) pronounced its award directing all the states to implement the agreements and making these agreements as part of the award. The Government of India accepted the same and published (it) in the Gazette of India on 26th July 1980.'[1]

State wise Allocation of Godavari Waters as per GWDT in TMC:-

- Maharashtra – 888.90 TMC
- Karnataka – 19.90 TMC
- Madhya Pradesh (formerly) – 625.46 TMC
- Andhra Pradesh (formerly) – 1172.78 TMC
- Orissa (formerly) – 292.96 TMC

Arguments about Unequal Water Sharing between Telangana Region and Andhra Region in the Telangana Statehood Discourse

*'The...allocation is only a paper allocation of theoretical availability of water in Godavari basin and sub basins. Water availability in several sub basins is worked out by impractical formula based on arbitrary classifications of catchment area and taking into account the rainfall of rain gauges stations...prior to 1970. The actual data of several sub basins at critical locations were not available to come to reasonably correct figure of available flows. Therefore, the total availability was approximately fixed at 3,000 TMC.'*2

'Godavari Water Dispute Tribunal permitted AP to utilise 1480 TMC ft of water, based on 75 per cent dependability. The dependable water available of future projects is 657 TMC ft. In case the catchment area and cultivable area is considered for distribution in AP, Telangana is entitled to utilise 1100 TMC ft out of

[1] S. Prabhakar, 'Availability and Utilisation of Godavari Waters for the Upland Areas of Andhra Pradesh', *Proceedings of a National Seminar on Regional Identity and Articulation*, Department of Geography, Osmania University, March 18-19, 2005,p.4.
[2] Ibid, p.5

1480 TMC ft. The cultivable areas in Telangana in Godavari basin is about 63.00 lakh acres and about 2.65 lakh acres only is available in coastal districts…'3

A related argument was that, "in order to provide additional water to meet the requirements of the Krishna delta Polavaram and Dummugudem projects are being proposed to divert Godavari water to Krishna river...When the Tribunal has already confirmed availability of water for kharif crop of Krishna delta there is no need to divert waters to Krishna barrage to the extent of 80 TMC under Polavaram project. In principle (if / when) any diversion is to be proposed the requirement of donor basin has to be met first...This principle is being ignored....(when proposals are made for diversion to Krishna river without serving the needs of upland at least for a single crop of kharif in Telangana region which is very backward."[4]

The agreement on Polavaram Project provides for diversion of 80 TMC of Godavari Water from Polavaram Project to Krishna River upstream of Vijayawada Anicut. The water thus diverted in Krishna will be shared as under

- Andhra Pradesh 45 TMC
- Karnataka & Maharashtra 35 TMC

- The Inchampalli Multipurpose Project will be a joint venture of Madhya Pradesh, Maharashtra and Andhra Pradesh to be executed and operated under the directions of a Tripartite Inter-State Control Board. The cost of storage, power and benefits will be shared by these States in agreed proportions. Andhra Pradesh is allowed to divert 85 TMC of waters from Inchampalli Reservoir for its use. The balance available water is to be used for power generation at Inchampalli Power House. After generation, the water can be used by Andhra Pradesh in any manner.

- As per the award any alteration, amendments or modification to any of the provision of the Tribunal can be made by agreement between the party States or by legislation of Parliament.

[Source-http://www.india-wris.nrsc.gov.in/wrpinfo/index.php?title=Main_Page]

15. Polavaram Project

(States involved: Odisha, Chhattisgarh, Telangana): details

It is the largest dam project under construction in AP since independence. It will be the largest human displacement so far (bigger than the SSP on Narmada), affecting the largest number of

[3] Ibid. Of these, East Godavari had 66.8 per cent of the catchment area, West Godavari 20 per cent and Khammam had 51.8 per cent.

[4] D. Bheemaiah, "Godavari Krishna Link: a Bane for Telangana", Proceedings of a National Seminar on Regional Identity and Articulation, Department of Geography, Osmania University, March 18-19, 2005

Scheduled Tribe population, and the largest forest submergence, including parts of a National Park (Papikonda National Park), so far. Implications on the flow of Godavari river will be phenomenally irreversible affecting the estuary, mangroves on the south-eastern coast and shall result in shifting of the mouth of the estuary, if earlier studies on the impact of the Cotton Barrage are anything to go by, some of which are shared herein.

As per a DPR circulated in 2005-06 by the then AP government, "The Polavaram project is conceived as a multipurpose project conferring irrigation benefits to an extent of 7.20 lakh acres in the upland areas of West Godavari, Krishna, East Godavari and Vishakhapatnam districts, water supply of 0.664 Tmucum (23.44 TMC) for industries in Vishakhapatnam Township and Steel Plant, besides domestic water supply to 28 lakh people in 540 villages enroute and generation of Hydel power with an installed capacity of 960 MW, development of pisciculture and providing recreation benefits and diversion of 2.226 TM cum (80TMC) of Godavari waters to Krishna river."

Area under submergence

- Agriculture unirrigated – 22882 ha
- Poramboke – 12081 ha
- Forest – 3223 ha
- Total = 38186 hectares

BC Ratio (Benefit Cost Ratio) – 2.54: 1

Apart from submergence of human habitations, and forest area, the project also has implications on some of the sites of archaeology and heritage, as seen by the state Archaeology and Museum department of the former government of AP. This was also mentioned in the DPR. Between 1985 and 1991 two reports (in two Parts) were submitted by the Archaeology and Museum Department (Government of Andhra Pradesh) suggesting that 12 sites on either banks were to be excavated in the submergible area and shifting of sculptures numbering 30 found on the left bank area to Rajahmundry and 50 Nos on R/S to be shifted to Khammam, which would require dismantling, transportation and reconstruction. The report also made a mention of five sites of Archaeological importance on Left Bank of Sabari. Part-III report (1992-1994) made a note of survey of Archaeological and Historical sites on Sabari basin and Sileru in Khammam District. However, in the end, the State Archaeology and Museums Department gave a no objection certificate for clearance of the project. (DPR circulated by the I&CAD, Government of AP)

16. Impact on Coringa Mangrove

The Godavari in these parts is also referred to as Gautami, Akhanda Godavari, and Vasishtha Godavari. Mangroves thrive on the principle of availability of fresh water and sea water. Seasonal flooding of river Godavari, thus, in a significant factor in the health of mangroves, and helps them flourish because they bring the volume of discharge needed for the mangrove habitat to breathe. It is a 'scientifically established' fact, and yet does not alter the mainstream ideas of rivers and floods as being mere disasters, meant to be totally stopped, if they could be. Floods are helpful in bringing the discharges.

This is the largest surviving patch of mangrove forests in AP with more than 65 mangrove tree species.

> *'According to the Forest Department, Government of AP, the total area under mangrove wetlands in the two estuaries is 2, 363.32 ha under Godavari mangroves and 24, 999.47 ha in the Krishna delta. Godavari mangroves are located between 16° 30' – N' and 82° 23' E in the East Godavari district."*[5]

Coringa Wildlife Sanctuary (in the Coastal Regulatory Zone) named after a village Coringa in East Godavari district was declared a wildlife sanctuary by the Government of AP (GO Ms. No. 484, 1978).

The colonial records mention Coringa thus:-

> *'Coringa (vernacular Korangi) is nearly ten miles south of Cocanada. Population 4, 258. It contains a travellers' bungalow, a native rest-house, a police station and the offices of a deputy tahsildar who is also a sub registrar. It was once one of the greatest ports and ship building centers on this coast; but, owing to the silting up of the channel which leads to it, it is now of no commercial importance... It appears that the present town of Coringa, which is on the east of the river was 'built' about 1759 by Mr. Westcot a resident of Injaram... The old village was also damaged by the tidal wave of 1706. The place is indeed a shadow of its former self. Its sea-borne trade was valued in 1877-78 at Rs. 8, 22,000 and in 1880-81 at Rs. 3,20, 000; but by 1884-85 it had fallen to Rs. 33,000; and since 1898-99 it has ceased altogether…Till quite recently…ships were repaired in mud docks at old Coringa. The silting of the port has progressed very rapidly in recent years…The river Coringa is said to have been brought to the sea by the sage Atri, and the bathing place is called the Atreya-*

[5] T. Ravishankar, R. Ramasubramanian, D. Sridhar, N. Srinivas Rao, M. Maqbool and D. Ramakrishna, "Community Participation in Joint Mangrove Forest Restoration and Management", in S. K. Patnaik, H. N. Thatoi, eds, Mangrove Conservation and Restoration: Proceeds of the National Workshop on Mangrove Conservation, Bhubaneswar, 2001, p.110

sagara sangam. It is also believed that demon Maricha, who was sent by Ravana in the form of a golden deer to Rama, when he and Sita were at Parnasala, was killed by Rama at this place. Rama is supposed to have founded the Siva temple of Korangeswara. ..'[6]

The Coringa Wildlife Sanctuary (WLS) has three Reserved Forests (RFs), which are - Corangi RF, Corangi Extension and Bhairavapalem RF. Then there are other RFs in the non-sanctuary area - Rathikaluva, Masanitippa, Matlatippa, Balusutippa, Kothapalem and Kandikuppa. Among the species of flora found here, are Avicenia officinalis (*nalla mada*), Avicennia marina (*tella mada*), Avicennia alba (*vilva mada*), Rhizophora mucronata (*uppu ponna*). The endangered Smooth Indian Otter, Jackal Monkeys and Fishing Cat are also found in this sanctuary. The WLS has an 18 km long sand pit in the north eastern side where Olive Ridley turtles nest between January and March every year. Over 120 bird species, including Little Egret, Cattle egret, Pied Kingfisher, Small blue kingfisher, pond heron, Reef Heron, Red Wattle lapwing, Crow Pheasant, Brahminy Kite, Little Cormorant can be spotted during low tide when they manage to get their feed on elevated mud flats having small fish, shrimps and molluscs. "Rare species likes Sonneratia alba (Pedda Kalinga), Rhizophora mucronata (Uppu Ponnam Tamarix troupii (Palivelu) also found here…180 species of fish, 20 species of mollluscs, 40 species of crustaceans. It provides a fine habitat for Grey Herons, Egrets, Spotbilled Pelicans, Painted Storks…[7]

Mangroves have their own distinct habitat and needs for sustenance.

'Freshwater flows into the mangrove wetlands of the Godavari delta for a period of six months; the peak flow normally occurs during July to September, coinciding with the southwest monsoon season. During this period, the entire delta, including the mangrove wetland, is submerged under freshwater. A large bay called Kakinada bay is associated with the northern part of the Godavari estuary…'[8]

Several studies that have documented changes over a period of time on the mangroves. Especially regarding the colonial anicut at Dowlaishwaram (which irrigates nearly 410, 000 ha. in East and West Godavari district).

'A major part of the Godavari mangroves is separated from the Bay of Bengal by Kakinada Bay. Two major shifts in the main course of the Godavari River and the formation of a sand spit have occurred since the construction of the Cotton Barrage at Dowlaiswaram in 1852 Until the 1930s, the

[6] Madras Gazetteer, Godavari District, pp.210-212
[7] Information courtesy Ms. Farida Tampal, State Director, WWF, India, AP Chapter (2006)
[8] *Joint Mangrove Management in Tamilnadu*, MSSRF, Chennai, supported by the India-Canada Environment Facility, New Delhi. Not dated. Courtesy, MSSRF office, Kakinada

Godavari flowed northwards, opening into Kakinada Bay. Between the 1930s and the 1970s, its course gradually shifted southwards… Since the 1970s the Godavari River flows eastwards. These shifts can be explained by a combination factors including the flatness of the alluvial zone, variations in river flow, and frequent cyclonal activity in the area… Fishermen unanimously reported that the catches have declined over the past 10 year…'[9]

'Geomorphologically, the Gautami river has undergone changes after the construction of the Cotton Barrage at Dowlaiswaram in 1852. In 1893, Kothapalem mouth had deepened and widened considerably and hence the major flow of freshwater was taking place through the Kothapalemn mouth. By 1985 the Kothapalem mouth had gradually silted up and after the floods in 1986, the major outflow of fresh water started taking place through the Bhairavapalem mouth and only very little flow now takes place through the Kothapalem mouth. Due to change inflow patter the Kothapalem RF, Masanitippa RF and Balusitippa RF have been affected due to the reduction in fresh water flow. In Masanitippa RF and Matlatippa RF, the land has become relatively elevated due to the subsidence of the delta and silt deposition by rivers. As the land becomes elevated the area is unable to receive any tidal flushing as a consequence of which only the fringe areas support mangroves while the interior areas are devoid of any vegetation. This is also true in Corangi RF. Another notable feature after the construction of the barrage is that the peak flow of freshwater takes place only during four months starting from July to October. From November the flow dwindles very rapidly and this trend continues to the negligible flow during the summer months of April and May and sometimes to June. Hence this reduction in fresh water is also a significant cause for degradation.…'[10]

But this is a science the farming communities (a lot of them dalits) in this habitat understand. Just as Vijayalakshmi and Veeraraghavulu had said — "We bless Godavari and look forward to her eagerly. It is only in the three months when she comes [floods] that we plant our crops; our agriculture, on our small pieces of land opens on Godavari *talli* (mother Godavari). Without that we cannot cultivate our fields."

17. A bizarre outcome of interlinking of Godavari-Krishna Rivers

An alien fish is wreaking havoc in the Krishna river after it was linked to the Godavari

Fishermen say the non-native rakashi fish, which no one wants to buy, is damaging their nets and keeping other fish away.

Aug 07, 2016 · 03:30 pm Updated Aug 07, 2016 · 09:19 pm

[9] Dahdouh-Guebas, S. Collin, T. Ravishankar, et.al, Analysing ethnobotanical and fishery-related importance of mangroves of the East Godavari Delta (Andhra Pradesh, India) for conservation and management purposes, *Journal of Ethnobiology and Ethnomedicine*, 2006, 2:24, 8 may, 2006. http://www.ethnobiomed.com/content/2/1/24.

[10] T. Ravishankar, et al, 2001, p.110*ff*

Manasa Chennapragada

http://scroll.in/article/812786/an-alien-fish-is-wreaking-havoc-in-the-krishna-river-after-it-was-linked-to-the-godavari

The linking of the Godavari and the Krishna rivers in Andhra Pradesh, which was inaugurated last year, seems to have led to an unforeseen problem.

Fishermen in Guntur district's Tadepally village on the banks of the Prakasam Barrage, which straddles the Krishna, are complaining that a species of fish, hitherto never seen in the river before, was damaging their nets and scaring away other fish. Consequently, they say their catch, and earnings, have dropped.

"I have been a fisherman since I was child," said Paikam Suresh, 35, of Tadepally village. "Nowadays we are catching a new kind of fish which we call rakashi. This rakashi is ruining our livelihood."

Drop in income

Rakashi, in Telugu, means the devil. The fishermen of Tadepally have given the fish this name thanks to the havoc it is wreaking with their livelihood.The carnivorous fish belongs to the armoured catfish family. It is not native to the Krishna river, where species like the Bengal carp (catla), reba carp, grunter, white carp (mrigal), the snakehead (murrel) and other small fish called jalalu locally are found.

The rakashi is more trouble than it is worth. For one, there is scant demand for it. Then, fishermen complain that the rakashi's fins get entangled in their nets, and it takes at least two hours to extricate it. If 10 such fish get entangled in one net, it can take the whole day to get them out. Fishermen say they are often forced to cut their nets to extricate these fish. All this has affected their daily income.

Suresh and his fellow fishermen say they used to earn Rs 500 a day from catching 200-300 fish. Now their catch has dwindled, and no one wants to buy the rakashi that they invariably catch.

"We are a poor family and because of this fish our nets are being spoiled," said Suresh. "Each net costs a minimum of Rs 5,000. Also the Rakashi feeds on other fishes in the river and we are losing our livelihood."

He added: "Recently officials from the Fisheries Department came and examined the fish and told us not to sell or eat it."

Suresh said that the fish had only been spotted since the Pattiseema lift irrigation project started. The Rs 1,300 crore project, inaugurated in August 2015, is envisioned to take 80 thousand million cubic feet of water from the Godavari through the Krishna to Andhra Pradesh's parched Rayalaseema district.

Dangerous for diversity

Flummoxed experts are now studying whether the new species entered the Krishna river from the Godavari.

"Even we came know about this only recently," said M Basava Raju, joint director of fisheries, Andhra Pradesh. "It might have come due to the interlinking of Godavari and Krishna waters. Even we don't know the exact reason. We have asked our officials to investigate."

Farida Tampal, state director, Worldwide Fund for Nature in Hyderabad sounded an alarm, saying that the armoured catfish doesn't belong to either the Godavari or the Krishna rivers.

"It is highly carnivorous and an aggressive breeder too," she said. "We have to take immediate steps to eradicate this breed. Government officials don't take anything seriously until we lose all our fish diversity. It feeds on other fish species, especially on fingerlings. That way it is more dangerous."

Tampal added that the rakashi is a native of South America that lives in shallow muddy waters and hooks onto pebbles using its spines.

Since the fish also feeds on algae, it is much sought after across the world as an aquarium fish, as it keeps the tanks clean. Tampal added that even the South Americans are trying to eradicate this fish from their rivers.

Environmental impact study

Marine experts say that rivers should not be interlinked without studying the environmental impact of such projects on marine life.

"Before interlinking rivers, we have to consider many things," said marine biologist A Manimekalan. "We have to study the native species present in that area, see how breeding is affected if rivers are interlinked."

Manimekalan added: "Rivers can be interlinked if they have the same native species in both waters. Otherwise the entire ecosystem will be disturbed."

Tampal agreed. "Apart from different species, even pollutants can be carried from other river to another and water quality could change," she said. "It is difficult to predict all this as this type of research is very poor in India. Interlinking needs to be studied seriously before implementation."

18. Pollution

The following are older records, but useful.

'In the AP rivers, the freshwater shark, 'goonch' (*Bagarius bagarius)* has long disappeared. The migratory hilsa has been affected due to the barrage on the Godavari river. Such indigenous species as *Labeo fimbriatus*, *Labeo calbasu*, *Tor khudree*, which were abundant in the earlier years of impoundment in Nagarajunasagar, declined over years due to habitat loss and breeding failure. These were replaced by minnows, which are of little commercial significance.' (AP Water Vision, Vol. I: 22)

'According to the APPCB, the Godavari river water quantity is within safe limits up to Mancherial but polluted further downstream. Along the Godavari, the major polluting points identified are Ramagundam, Mancherial (AP Rayons), Bhadrachalam (Paper Mills) and Rajahmundry.' (Cited in Umamaheshwari, 2015:236)

18.1 Polluted loads in Godavari

'Total biochemical oxygen demand = 998 tonnes (90.6 per cent from industries)

Total pesticides consumption in the Godavari basin = 21,586 tonnes

(AP, Maharashtra, Madhya Pradesh– Chhattisgarh)

Wastes from industries = 808 million cubic meters per year (apart from organic wastes these contain toxic wastes also)

Organic pollution load from urban areas = 414 tonnes per day'

The data on riverine fisheries is particularly unavailable as there is no regular collection of data by the Department of Fisheries in spite of many fisherfolk whose livelihood is dependent on it. But the Central Inland Capture Fisheries Research Institute (CICFRI) has collected some data for Godavari for 1963-69. Even during that period, there had been a continuous fall in catches over the years. Constant catch data in these selected zones together showed a decline from 330 tonnes to 218 tonnes. Though not documented, the enquiries with fisherfolk indicate that the catches from rivers have continuously come down both in terms of the number of species and the quantity of catch. The reasons could be attributed to the reduction in flow due to dams and also due to natural reasons, siltation, sand quarrying , pollution and over-fishing…There is a clear need to undertake a state-wide assessment of fish stocks within the context of overall ecosystem biodiversity assessment. Detailed biodiversity studies of freshwater fishes (of for that matter any aquatic species) are yet to be done in AP. The migratory 'hilsa' has been affected due to the barrages.' [11]

'According to the Zoological Survey of India, the loss of fish biodiversity is due to habitat destruction caused by: dams, deforestation, expanding agricultural practices, discharge of effluents, over fishing (fishing young ones or the brooders included), destructive fishing methods, example, use of explosives and poisons, removal of gravel and sand from river beds, introduction of exogenous species, that may dominate the indigenous species.'[12]

Water quality of Godavari at Basra (Kavalguda), Maharashtra in the period 2005-2012:

[11] Government of Andhra Pradesh Water Vision Draft II, Mission Support Unit. Water Conservation Mission, Government of Andhra Pradesh, 2004, pp.3.8; 3.9; 3.12

[12] All references to the above document (Water Vision), in Umamaheshwari, 2015, pp. 235-37.

'DO concentration ranges between 4.0mg/1 and 6.8 mg/1 during year 2005 and 2008. COD concentration ranges between 8.7 mg/1 and 31.44 mg/1 in the same year 2008. TDS concentration ranges between 186 mg/1 and 1081 mg/1 in year 2008. TC count ranges between 258 MPN / 100 ml and 5400 MPN / 100 ml during year 2005 and 2008 respectively.' [Water Quality of Rivers at Interstate Borders, CPCB, New Delhi, 2015, pp. 111-12]

Water quality of Uttarapinakini (North Pennar) at Hindupur (Andhra Pradesh) between 2005-2010:-

'DO concentration ranges between 0.8 mg / 1 and 5.4 during year 2005 and 2009 respectively. BOD concentration ranges between 0 mg / 1 and 2 mg / 1 during year 2010 and 2009 respectively. COD concentration ranges between 3.85 mg / 1 and 19 mg / 1 during year 2008 and 2009 respectively. TDS concentration ranges between 1223 mg / 1 and 15552 mg / 1 during 2008 and 2009 respectively.' (Ibid, pp. 111-112)

18.2 Polluted River Stretches in Andhra Pradesh

Water Quality of rivers in A.P. is monitored at 50 locations on 9 rivers and out of which 38 locations are non-complying to the Water Quality Criteria with respect to BOD. These 38 locations are on 6 rivers. The names of 6 polluted rivers are Godavari, Hundari, Krishna, Tungabhadra, Pennar and Kundu.

These rivers are classified in **five classes** based on the level of BOD falling in priority class-V.

Table 3: Polluted River Stretches -AP

S no.	River Name	Stretch Identified	Towns Identified	Approx length of the stretch (in Km)
1	Godavari	Rayanapeta to Rajahmundry	Rajahmundry, Rayanapeta	140
2	Hundri	Laxmipuram to Joharpuram (Kurnool)	Kurnool	10
3	Krishna	Amaravati to Hamsala Deevi	Vijayawada	270
4	Tungabhadra	Manthralayam to Bavapuram	Kurnool	50
5	Pennar	Tadpatri to Nellore	Jammalamadugu,	120

			Proddattur, Cuddapah	
6	Kundu	Nandyal to Madduru	Nandyal	120

[Source: River Stretches for Restoration of Water Quality, CPCB, MoE&F&Climate Change, New Delhi, February, 2015, pp.10-11). Website: www.cpcb.nic.in]

The above report also shows river Krishna as a polluted river in the states of Maharashtra, Karnataka and in Telangana.

18.3 Polluted River Stretches in Telangana

There are 38 monitoring locations on rivers in Telangana out of which 18 locations are exceeding the Water Quality Criteria limit with respect to BOD. These 18 non-complying locations are situated on 7 rivers. The names of the rivers are; Godavari, Krishna, Manjeera, Musi, Nakkavagu, Sabari and Maner. These rivers are classified in three priority classes (Class – I, II and V).

The details of polluted river stretches are provided in Table

Table 4: Polluted River Stretches in Telangana

S no.	River Name	Stretch Identified	Towns Identified	Approx length of the stretch (in Km)
1	Godavari	Kamalapur to Burgampahad	Basar, Mancherial, Ramagundam, Manthan, Kamalapur,Burgampahad	100
2	Krishna	Thangadigi to Wadapally	Thangadigi, Guntur	80
3.	Manjeera	Gowdicharla to Nakkavagu	Gowdicharla	110
4	Musi	Hyderabad to Suryapet	Hyderabad, Rangareddy, Nalgonda	150
5	Nakkavagu	Patancheru to Gowdicharla	Medak, Bachugudam	50
6	Sabari	Palavancha to Burgampahad	Khammam	50

7	Maner	Warangal to Somanapalli	Warangal, Karimnagar	150

[Source: River Stretches for Restoration of Water Quality, CPCB, MoE&F & Climate Change, New Delhi, February, 2015, pp.32-3]

18.4 State-wise Polluted River Stretches and Priority Classes

Andhra Pradesh

Table 5: Pollution Level of Rivers in Andhra Pradesh

River Name	Stretch Identified	BOD Range/ Max Value	Priority	Towns
Godavari	Rayanapeta to Rajahmundry	6.0	V	Rajahmundry,Rayanapeta
Hundri	Laxmipuram to Joharpuram (Kurnool)	4.0	V	Kurnool
Krishna	Amaravati to Hamsala Deevi	3.5-5.3	V	Vijayawada
Tungabhadra	Manthralayam to Bavapuram	3.4-3.6	V	Kurnool
Pennar	Tadpatri to Nellore	3.1-6.0	V	Jammalamadugu, Proddattur, Cuddapah
Kundu	Nandyal to Madduru	3.2	V	Nandyal

Telangana

Table 6: Pollution Level of Rivers in Telangana

Godavari	Basara to Khammam	6-26	II	Basara, Mancherial, Ramagundam, Manthan, Kamalapur, Burgampahad
Krishna	Thangadigi to Wadapally	6.0-2.4	II	Thangadigi, Guntur
Manjeera	Gowdicharla to Nakkavagu	3.2-4.6	V	Gowdicharla

Musi	Hyderabad to Nalgonda	8.6-165	I	Hyderabad, Rangareddy, Nalgonda
Nakkavagu	Gandilachapet to Sevalal Thanda	64	I	Medak, Bachugudam
Sabari	Khammam to Kannapuram	3.7	I	Khammam
Maner	Warangal to Somanapally	25-27	II	Warangal, Karimnagar

Rivers with Water Quality Sites and Toxic Metals, due to which they are Unfit

Vamsadhara	Kashinagar	Ni, Fe
Wainganga	Kumhari	Cu, Ni
Wainganga	Pauni	Cu, Ni
Wainganga	Ashti	Cu, Ni
Wardha	Hivra	Cu, Ni

Details of Indian rivers and their sites where the water was found fit for use in terms of toxic metal contamination during the study period

Godavari, at Bhadrachalam, Mancherial, Perur, Polavaram

Water Quality Site

Table 7: Pollution Level of Rivers in Telangana

	Location	**Pre-Monsoon**		**Monsoon**		**Post-Monsoon**		**Above 10 µg/L**	**Below 10 µg/L**
Arsenic (in µg/L)	**Bhadrachalam**	3.226	3.900	3.990	0.350	0.00	7.29	0	5
	Polavaram	4.392	4.430	6.330	0.440	0.00	7.61	0	5
	Konta	1.414	1.235	2.275	0.050	0.00	3.31	0	5
Cadmium (in µg/L)	**Bhadrachalam**	0.137	0.141	0.131	-	0.00	0.19	0	*5*
	Polavaram	0.115	0.191	0.097	0.000	0.00	0.22	0	5
Chromium (in µg/L)	**Bhadrachalam**	1.730	1.055	2.110	2.320	0.00	2.32	0	5
	Polavaram	3.786	1.550	7.315	1.200	0.00	10.12	0	5

Copper	**Bhadrachalam**	3.862	2.810	1.605	10.480	0.00	10.48	0	5
(in µg/L)	**Polavaram**	16.690	2.880	30.975	15.740	0.00	42.80	0	5
Nickel	**Bhadrachalam**	8.810	10.810	9.170	4.090	0.00	17.29	0	5
(in µg/L)	**Polavaram**	6.486	6.420	7.230	5.130	0.00	12.72	0	5
Lead	**Bhadrachalam**	1.691	2.508	0.450	1.300	0.00	3.78	0	5
(in µg/L)	**Polavaram**	2.926	3.521	3.580	1.080	0.00	3.63	0	5
Mercury	**Bhadrachalam**	0.350	0.320	0.380	-	0.00	0.38	0	2
(in µg/L)	**Polavaram**	0.700	0.680	0.720	-	0.00	0.72	0	2
Zinc	**Bhadrachalam**	0.010	0.013	0.008	0.008	0.000	0.022	0	5
(in mg/L)	**Polavaram**	0.007	0.010	0.005	0.005	0.000	0.016	0	5
Iron	**Bhadrachalam**	0.063	0.032	0.079	0.094	0	0.11	0	5
	Polavaram	0.096	0.055	0.141	0.090	0	0.18	0	5

Total four Indian Rivers, viz. Cauvery, Pennar, Yamuna and Hindon are contaminated through cadmium at 7 water quality monitoring stations.

Details of WQ sites, Rivers and toxic metal concentrations found above the BIS acceptable limist during the study period.

Chennur Pennar Aug/13 3.13
Nakkavagu

Patancheru – Industrial estate, Nakkavagu

[Source: Greenpeace, in a 2006 report]

In 1991 there were 276 industries in Patancheru…In a 2 decade period (1975-1995) .. 6 industrial estates [came up] in 'backward regions' around a thirty-mile radius of Hyderabad. The largest was the 440-hectare estate in Patancheru. Some of the states biggest bulk drug and pharmaceutical industries are located in these industrial estates. Bolaram has an Industrial Development Area. This is a private industrial area developed by entrepreneurs and has many small and medium scale industries. Most of these industries are pharmaceutical units that manufacture bulk drugs like sulphamethoxazole,

ibuprofen, trimethoprim and paracetamol. There are around 40 industries in this area …There has been no proper waste disposal facilities built in these areas, combined with this is the fact that industries have been wantonly disposing off their waste in nearby land or into water bodies.

The combined industrial estates in Bollaram and Patancheru generate a cumulative 8 x 10 6 1/day of effluents which are directly discharged into surrounding land, irrigation fields and surface water bodies.. The Nakkavagu stream that flows through the industrial estate in Patancheru bears the brunt of waste disposal of over 100 industries. This, once clean, stream was used by surrounding villages for irrigation and drinking purposes. The estate, which consists of paint, plastic, chemical and bulk drug industries routinely dump their waste into the stream. Pollution to this stream has destroyed approximately 2000 acres of farmland besides contaminating well water to the level of 140 feet….A study reported in the journal Environmental Monitoring and Assessment states 'A conservative estimate indicates that the effect of pollutants on the agricultural lands and water bodies extends 0.25 to 0.5 km to either side of the Nakkavagu river over a length of 25 km.

A PIL was filed in the Supreme Court in 1997. The petition filed by Dr A Kishen Rao, Dr Purroshottam Reddy and two others complained that highly toxic effluents discharged by hazardous industries in and around Patancheru and Bollaram industrial estates were creating destroying lives of people, cattle crops and water sources besides flora and fauna. The petitioners further complained that most of the industries did not have pretreatment plants and were sending their effluents to a CETP by tankers.15 However prior to this PIL the High Court in 1990 had ordered the closure of 10 units in Bollaram Industrial estate as they had not constructed a treatment plant inspite of an earlier court direction.

There is a long history of legal battle in Patancheru. In an earlier order by the Supreme Court, in the case of Indian Council For EnviroLegal Action and others Vs Union of India and others in 1995 the court had ordered the state to recover compensation from industries, this was to be distributed amongst the affected people. The total amount was Rs. 1,39,09,737/-. The Court ordered the APPCB representative to determine other "industries responsible for discharge of effluents causing environmental degradation."

The Supreme Court over a 3-year period (May 1998 – Feb 2001) passed out many orders, following which the case was transferred to the High Court for further proceedings.

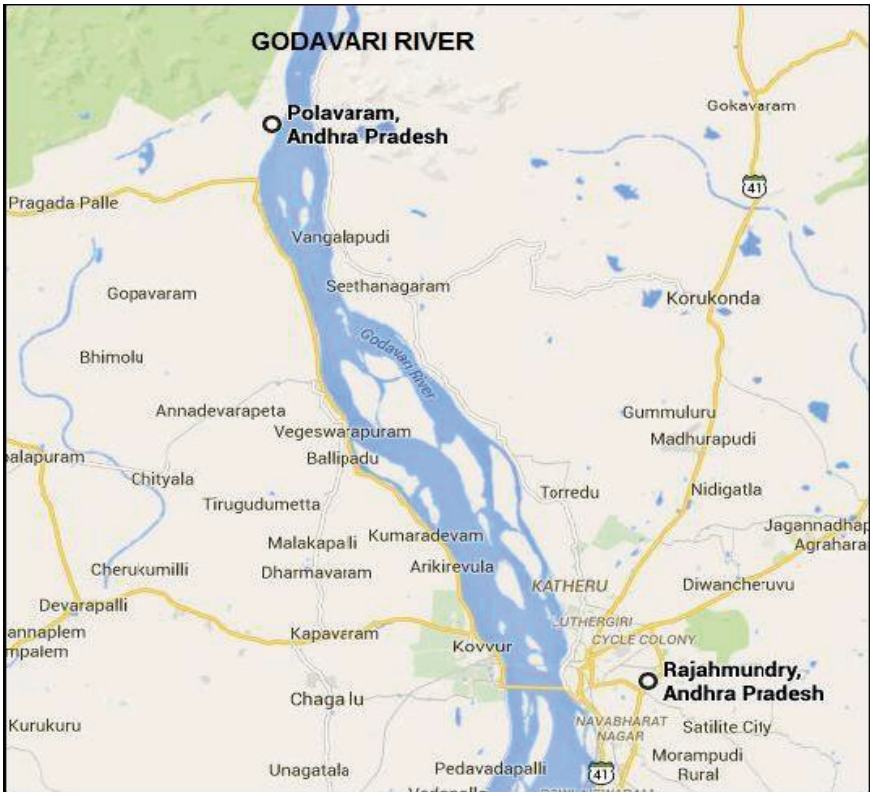
The cases in the Supreme Court and High Court also highlighted the inadequacy of the Common Effluent Treatment Plant sent up in Patancheru. The Supreme Court points out to a report that indicts the Plant to be a major cause of pollution.

The Common Effluent Treatment Plant at Patancheru received around 5000 tankers of industrial pollutants. From this total around 3500 trucks come from seven industries that include Aurobindo Pharma, Neuland Laboratories, Dr Reddy's Labs and others….Ninety industries send their effluents to the Common Effluent Treatment Plant in Patancheru.

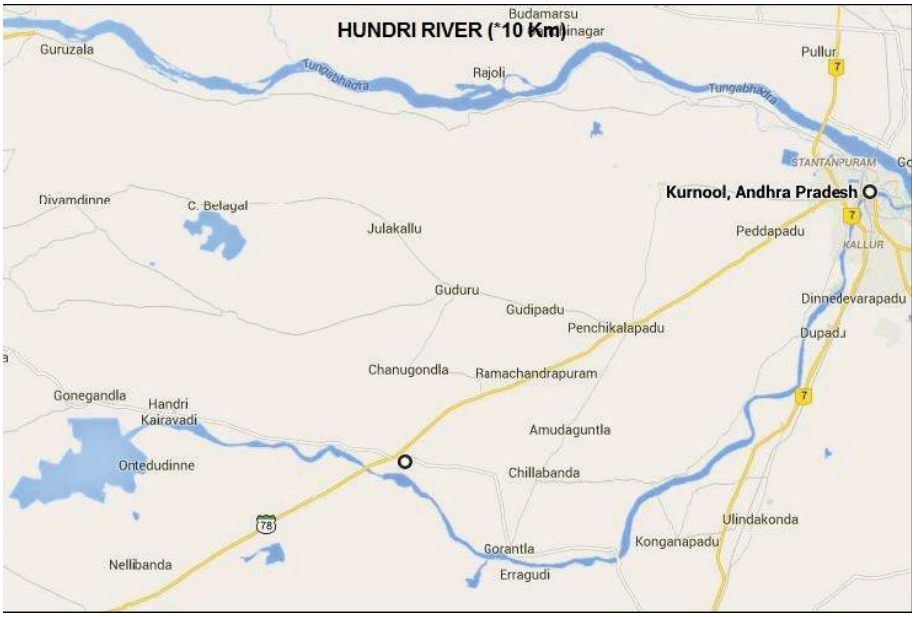
19. State-wise Polluted River Stretches, Digital Maps

[Source for all maps – AP and Telangana: River Stretches for Restoration of Water Quality, CPCB, MoE&F & Climate Change, New Delhi, February, 2015, p.59 (AP); p. 110 (Telangana)]

19.1 Polluted River Stretches in Andhra Pradesh

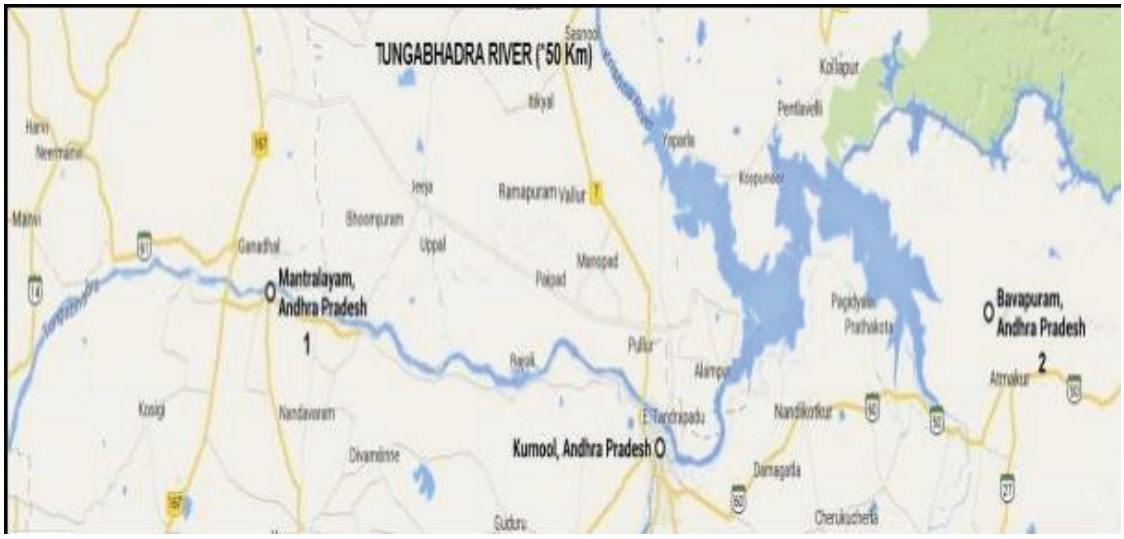


Map No 4: Godavari from Rayanapeta to Rajahmundry

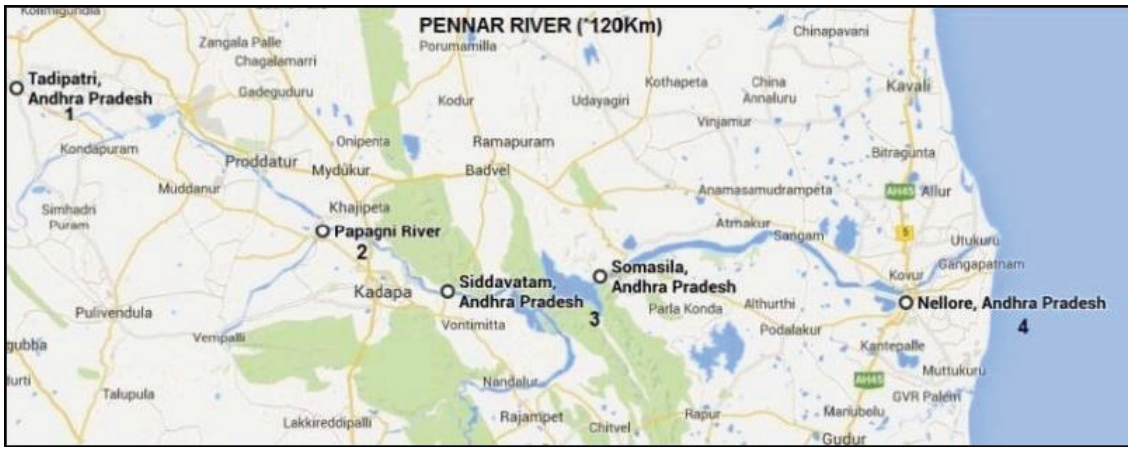


Map No 5: Hundri, Laxmipuram to Joharpuram

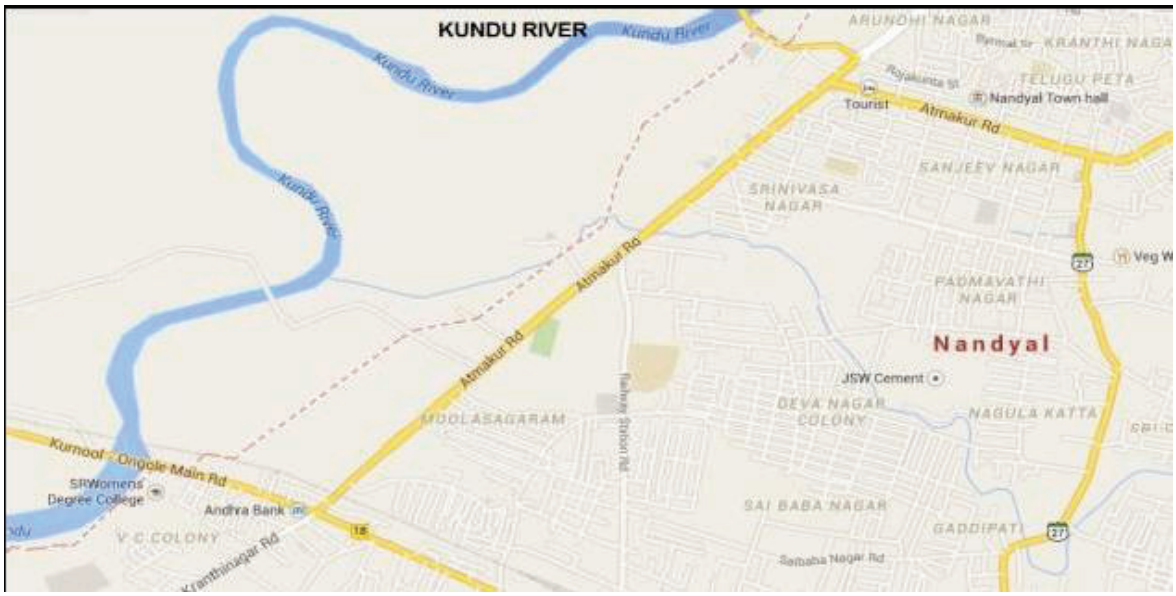
Map No 6: Krishna, Amaravati to Hamsala Deevi



Map No 7: Tungabhadra, Manthralayam to Bavapuram



Map No 8: Pennar, Tadpatri to Nellore



Map No 9: Kundu, from Nandyal to Madduru

19.2 Polluted River Stretches in Telangana

Map No 10: Godavari, from Kamalapur to Burgampahad

Map No 11: Krishna, from Thangadigi to Wadapally

Map No 12: Manjeera, from Gowdicharla to Nakkavagu

Map No 13: Musi, from Hyderabad to Suryapet

Map No 14: Nakkavagu, from Patancheru to Gowdicharla

Map No 15: Sabari, from Palavancha to Burgampahad

Map No 16: Maner, from Warangal to Somanapally

Note: All the rivers in AP and Telangana are listed as Polluted rivers (which includes perhaps most of the rivers in the country) in the above mentioned document of the CPCB. (Annexure, II, pp. 119-20)

Andhra Pradesh - Godavari, Hundari, Krishna, Tungabhadra, Pennar and Kundu falling in priority class – V based on the level of BOD
Telangana - Godavari, Krishna, Manjeera, Musi, Nakkavagu, Sabari and Maner. These rivers are classified in three priority classes (Class – I, II and V).

Andhra Pradesh has 8 cities / towns along polluted river stretches and there are six polluted river stretches. Telangana has 18 cities / towns along polluted river stretches and 7 polluted river stretches.

20. Data of Andhra Pradesh Pollution Control Board Draft Report (2014-15)

APPCB has three fully equipped Zonal Laboratories and nine Regional Offices to cater the needs of the water quality monitoring in the State of Andhra Pradesh.

a) Water quality monitoring of rivers, lakes, canals, ground water, STP outlets, etc. under National Water Quality Monitoring Programme – Assisted by CPCB

b) Water quality monitoring of Kolleru lake – APPCB

c) Water quality monitoring of rivers, canals, lakes, etc. during Ganesh idol immersion in various cities and towns. – APPCB

d) Monitoring of sea water quality all along the coast of Bay of Bengal under Coastal Ocean Monitoring and Prediction System (COMAPS)

National Water Quality Monitoring Programme (NWMP) – Monthly – 34
Half yearly - 18

20.1 Network of NWMP stations

Table 8: List of station on Godavari River

River Godavari – Station Code – Station - Frequency			
01	0014	Polavaram, East Godavari.	Monthly
02	2370	U/s of Nalla channel, Rajahmundry, East Godavari.	Monthly
03	2371	D/s of Nalla channel, Rajahmundry, East Godavari.	Monthly
04	1218	U/S of Rajahmundry, (Kumaradevam), East Godavari.	Monthly
05	3067	After joining the outlet of STP, Rajahmundry	Monthly
06	1219	Rajahmundry D/S (Dawaleshwaram), East Godavari.	Monthly

Table 9: List of station on Krishna River

River Krishna – Station Code – Station - Frequency			
07	1175	Srisailam, Kurnool district.	Monthly

08	3083	Down stream of Srisailam	Monthly
09	1786	Vedadri, Krishna district.	Monthly
10	1787	Amarawathi, Krishna district.	Monthly
11	0025	Vijayawada, Krishna district.	Monthly
12	3079	Ramalingeshwarnagar, Vijayawada	Monthly
13	1782	Hamsaladeevi, Krishna district.	Monthly

Table 10: List of station on Tributaries of Several River

Tributaries of river Krishna:			
14	1785	River Tundhadra at Maanthralayam, Kurnool district.	Monthly
15	1174	River Tundhadra at Bavapuram, Kurnool district.	Monthly
16	1177	Munneru at Nandigama, Krishna district.	Monthly
17	1178	Paleru at Jaggiahpet, Krishna district.	Monthly
18	2350	River Handri, Joharpur Village, Kurnool, Kurnool district.	Monthly
19	2351	River Kundu at Nandyal, Kurnool district.	Monthly
River Pennar			
20	1255	Unganoor, Tadipatri, Anantapur district.	Monthly
21	1256	Pushpagiri, Kadapa district.	Monthly
22	0030	Siddvatam, Kadapa district.	Monthly
23	1257	Somasila, Nellore district.	Monthly
River Nagavali			
24	1448	At Thotapally regulator, Vizianagaram district	Monthly
River Vamsadhara			

25	2352	Kalingapatnam, Vizianagaram, Vizianagaram district.	Monthly
Lakes and Tanks			
26	1790	Pulicat lake, Nellore district.	Monthly
27	2353	Kondakarla-Ava Lake.	Monthly
Canals and drains			
28	2354	Samarla kota canal, East Godavari district.	Monthly
29	2355	Tulje bagh canal, Tekri drain, East Godavari district.	Monthly
30	3051	Budameru canal, West Godavari district.	Monthly
31	3052	Guntathippa drain, Krishna district.	Monthly
32	3053	Tulia bagh drain, Vemulavada, East Godavari district.	Monthly
Openwells and Borewells			
33	26	Borewell at Vijayawada, Krishna district.	Half yearly
34	1513	Borewell, Autonagar (Krishnamurthy), Vijayawada, Krishna district.	Half yearly
35	1514	Borewell, Autonagar(Vijaykumar), Vijayawada, Krishna district.	Half yearly
36	1516	Borewell at Navlok gardens, Nellore district.	Half yearly
37	1517	B/w at Kurnool near Thungabhadra river (Mamidalapadu), Kurnool district.	Half yearly
38	1518	B/w at Nandyal (Kundu), Kurnool district.	Half yearly
39	1519	Borewell at Nagari, Chittoor district.	Half yearly

40	1520	Borewell at Srikalahasthi near Swarnamukhi river, Chittoor district.	Half yearly
41	1521	Open well at Mindi near Rama temple, Ward No.2, Visakhapatnam.	Half yearly
42	1522	Open well at Peddanuvvi, Vizianagaram.	Half yearly
43	1523	Borewell at Kovvur near M/s.Andhra Sugars, West Godavari district.	Half yearly
44	1524	Open well at Kakinada near Pratapnagar bridge, East Godavari district.	Half yearly
45	3087	Bore well near village secretariat, Pathapadu (V), Krishna district.	Half yearly
46	3089	Hand pump at Tanam village, Visakhapatnam district.	Half yearly
47	3090	Hand pump at Pittavanipalem, Visakhapatnam.	Half yearly
48	3091	Bore well at Kapuluppada dumpsite, Visakhapatnam.	Half yearly
49	3092	Bore well at Arinama Akkivalasa, Srikakulam.	Half yearly
50	3093	Bore well at Alladapalem village, Pydibhimavaram, Srikakulam.	Half yearly
STPs			
51	20004	Inlet of STP at Hukumpet, Rajahmundry.	Monthly

52	20004	Outlet of STP at Hukumpet, Rajahmundry.	Monthly

20.2 Water quality of River Godavari and its tributaries

Table 11: Water quality of River Godavari and its tributaries

S. No.	Code	NWMP Station	pH	TDS	DO	BOD	Hardness	T. Coli	F
01	0014	Polavaram	7.82	176	5.6	1	109	143	0.50
02	2370	U/s of Nalla channel, Rajahmundry	7.43	174	5.3	1	96	178	0.40
03	2371	D/s of Nalla channel, Rajahmundry	7.33	190	5.4	1	106	131	0.40
04	1218	U/S of Rajahmundry, (Kumaradevam)	7.84	178	5.5	1	84	260	0.40
05	3067	After joining the outlet of STP, Dhawaleswaram, Rajahmundry	7.5	213	5.3	1.1	---	---	---
06	1219	Rajahmundry D/S (Dawaleshwaram)	7.56	194	5.3	1	95	210	0.41

Note: All values are expressed in mg/lit except pH & T. Coliform (MPN/100 ml).

Inferences from the data: The data of annual averages obtained for river Godavari at 5 points is compared with that of the standards laid down in Primary Water Quality Criteria classification for the designated best use by the Central Pollution Control Board (annexure). The results suggests that Godavari river water falls under Class C, which is suitable to use as drinking water source with conventional treatment followed by disinfection and bathing purpose (Class – B).

20.3 Water quality of River Krishna and its tributaries

Table 12: Water quality of River Krishna and its tributaries

S. No.	Code	NWMP Station	pH	TDS	DO	BOD	T.Coli	Hardness	F
01	1175	Srisailam	7.2	393	6.01	2.3	523	157	0.4
02	3083	D/S of Srisailam	7.2	382	5.98	2.4	624	---	---

03	1786	Vedadri	7.7	436	6.52	0.7	1100	165	0.38
04	1787	Amarawathi	7.9	407	6.75	0.6	1108	125	0.3
05	0025	Vijayawada	7.8	413	7.2	0.7	1058	136	0.40
06	1782	Hamsaladeevi	7.66	15559	5.11	0.6	1529	3469	0.7
Tributaries to river Krishna									
01	1785	River Tundhadra at Maanthralayam	7.9	564	6.7	2.7	593	188	0.46
02	1174	River Tundhadra at Bavapuram	8.0	566	6.5	2.28	509	185	0.4
03	1177	Munneru at Nandigama	8.1	493	6.2	2.5	590	165	0.5
04	1178	Paleru at Jaggiahpet	7.8	580	6.9	0.7	1073	171	0.4
05	2350	River Handri, Joharpur Village, Kurnool	8.2	667	5.9	2.3	521	185	0.6
06	2351	River Kundu at Nandyal	7.8	494	6.6	3.3	591	194	0.5

Note: All values are expressed in mg/lit except pH & T. Coliform (MPN/100 ml).

Inferences from the data: The data of annual averages obtained for river Krishna at 6 points is compared with that of the standards laid down in Primary Water Quality Criteria classification for the designated best use by the Central Pollution Control Board (annexure). The results suggests that Krishna river water falls under Class C, which is suitable to use as drinking water source with conventional treatment followed by disinfection and bathing purpose (Class – B). High value of TDS for the point at Hamsaladeevi is due to sea water intrusion into the river.

20.4 Water quality of River Pennar

The Pennar River and its tributaries have low annual average rainfall and do not have enough flow for direct abstraction. Hence, infiltration-wells are used for most of the towns along the riverside. Annual average values of water quality monitoring results for the year 2014-15 are as follows:

Table 13: Water quality of River Pennar

S. No.	Code	NWMP Station	pH	TDS	DO	BOD	T.Coliform	Hardness	F
01	1255	Unganoor	7.75	630	6.57	2.86	367	206	0.90
02	1256	Pushpagiri	8.04	542	6.46	2.63	416	213	0.74
03	0030	Siddavatam	8.01	528	6.64	2.6	571	194	0.50
04	1257	Somasila	8.06	722	5.5	0.7	953	218	0.40
Note: All values are expressed in mg/lit except pH & T. Coliform (MPN/100 ml).									

Inferences from the data: The data of annual averages obtained for river Pennar at 4 points is compared with that of the standards laid down in Primary Water Quality Criteria classification for the designated best use by the Central Pollution Control Board (annexure). The results suggests that Pennar river water falls under Class C, which is suitable to use as drinking water source with conventional treatment followed by disinfection.

20.5 Water quality of River Nagavali

Nagavali River flowing in the North-East of the State is about 115 Km length and is confluencing with Bay of Bengal near Mofaz Bandar in Srikakulam district Swarnamukhi is a tributary of river Nagavali. The monitoring point is at "Thotapalli" regulator. Annual average values of water quality monitoring results for the year 2014-15 are as follows:

Table 14: Water quality of River Nagavali

S. No.	Code	NWMP Station	pH	TDS	DO	BOD	Hardness	F
01	1448	At Thotapally regulator	7.7	274	5.5	1.0	153	0.6
Note: All values are expressed in mg/lit except pH & T. Coliform (MPN/100 ml).								

20.6 Water quality of river Vamshadhara

Annual average values for the year 2014 -15

Table 15: Water quality of river Vamshadhara

S. No.	Code	NWMP Station	pH	TDS	DO	BOD	Hardness	F
01	2352	Kalingapatnam, Vizianagaram	7.8	231	5.6	1.2	136	0.3

Note: All values are expressed in mg/lit except pH & T. Coliform (MPN/100 ml).

20.7 Water quality monitoring of lakes, canals and drains

APPCB monitors lakes, canals and drains on a monthly basis. The “Kolleru” lake, which is polluted due to the discharges of industrial, municipal wastes and fishponds, is under monthly monitoring at 20 locations including the inlets, lake points and the outlet of the lake. The salt-water lake in Pulicat is a thriving bird sanctuary and it was declared as "Ramsar" site by MoEF in the year 1999 in consultation with WWF under wetland conservation. These two lakes are monitored because of either increase in the levels of critical parameters or on the point of conservation so as to improve the water quality and its management. Annual average values of water quality monitoring results of two lakes, Kondakarla-Ava lake and Pulikat lake for the year 2014-15 are as follows:

Table 16: Water quality monitoring of lakes

S. No.	Code	NWMP Station	pH	TDS	DO	BOD	Hardness	F
01	2353	Kondakarla-Ava Lake	7.5	413	5.8	1.1	191	0.3
02	1790	Pulikat lake	8.4	21492	5.0	0.7	4916	1.7

Note: All values are expressed in mg/lit except pH.

20.8 Water quality of canals and drains

Annual average values for the year 2014-15

Table 17: Water quality of canals and drains

S. No.	Code	NWMP Station	pH	TDS	DO	BOD	Hardness	F
01	2354	Samarla kota canal	7.3	200	5.2	1.2	114	0.5
02	2355	Tulyabagha canal, Teki drain	7.6	3581	5.2	1.3	435	0.6
03	3051	Budameru	7.3	711	2.2	3.6	184	0.6
04	3052	Guntathippa drain	7.0	1493	0.5	3.9	302	1.2
05	3053	Tulyabagha drain, Vemulavada	7.6	2006	5.1	1.3	494	0.5

Note: All values are expressed in mg/lit except pH.

20.9 Status of Water Quality of Kolleru Lake

Kolleru lake is a natural wet land situated between Krishna and Godavari deltas in the coastal districts of West Godavari and Krishna lying between the latitude 16o32' and 16o47' and longitude 81o05' and 81o21' E. The important activities in the lake area are agriculture and aquaculture. The lake is the drinking water source for the people living in the vicinity of the Kolleru Lake and it is a bird sanctuary for indigenous and migrating birds. The ecological degradation of the lake was set in due to extensive use of pesticides by farmers of Upper catchment and delta regions, bunding for pisciculture, draining of sewage and industrial pollutants through in-flowing drains and channels. APPCB is monitoring the water quality of the lake at 20 points. Physico-chemical parameters, (19) Bacteriological parameters (3) heavy metals (8) and pesticides are being analysed for all the above points.

20.10 Monitoring locations (inlet drains) of Kolleru Lake

Table 18: Monitoring locations (inlet drains) of Kolleru Lake

S. No.	Location	Potential sources of pollution	Remarks
1	West Tammileru at Gurukula-padu	Eluru Municipality	Municipal sewage & agricultural run off
2	Budameru at Arugolanu	M/s.The Krishna Dist. Milk Producers Union Ltd., (Vijaya Diary) Krishna Dist. & Vijayawada Municipal Corporation	Industrial effluent discharges and fish and discharges and agricultural run off
3	Chandiraiah drain at Nandigam	M/s. KCP Sugars Ltd., and M/s. KCP Distillery, Vuyyuru, Krishna Dist. Gudivada Municipality	Industrial effluent discharge agricultural and fish pond discharge
4	Polaraju drain at Kakatiya wagu	Agricultural run off	Agriculture drains and fish pond outlets
5	East Tammileru at NH 5	Eluru Municipality	Municipal discharges
6	Bulusu vagu at NH 5	M/s. West Godavari Co-operative Sugars Ltd., Bhimadole	Industrial effluent discharges, agriculture run off

7	Mondikodu drain	--	Agricultural runoff & fish pond discharges
8	Kovali drain	--	Agricultural runoff & fish pond discharges
9	Tokalapalli drain at Chebrolu undi road	Agricultural run off	Agriculture & fish pond discharges
10	Pandikodu drain at Chebrolu – Undo road	Agricultural run off	Agriculture & fish pond discharges

20.11 Monitoring locations in Kolleru Lake (Lake Points)

1. Pedaedlagadi on Eluru – Kaikaluru road
2. Chinaedlagai on Eluru – Kaikaluru road
3. Circar channel at Alapadu run off
4. Point of Sringavarapadu
5. Point at Kolleti kota
6. Gudivakalanka
7. Kokkirayalanka
8. Chettunnapadu

20.12 Outlet of Kolleru Lake:

Upputeru at Akiveedu Road Bridge

Water Quality monitoring results (annual averages) for the year 2014-15

Inlet drains of Kolleru Lake

Table 19: Water quality of Inlet drains of Kolleru Lake

Sampling Point	pH	TDS	COD	BOD	DO	T. Coli
West Thammileru	7.15	485	24	3.9	2.6	1200
Budameru	7.23	1176	26	2.9	3.8	1438
Chandraiah drain	7.29	726	21	3.8	1.8	1213
Polaraju drain	7.63	1287	28	2.6	4.8	1771

East Thammileru	7.42	568	19	2.1	4.8	963
Bulusu vagu	7.51	1999	33	2.7	3.6	2166
Mondikodu	7.29	743	20	2.5	4.1	1066
Kovvali drain	7.31	581	19	2.1	4.8	1025
Tokalapalli	7.28	771	21	1.8	5.1	1150
Pandikodu	7.23	1191	27	2.7	3.6	1437
Narasannapalem	7.47	632	21	3.2	3.1	1229

Outlet Kolleru Lake Points

Table 20: Water quality of outlet drains of Kolleru Lake

Sampling Point	pH	TDS	COD	BOD	DO	T. Coli
Pedda edlagadi	7.43	1073	29	3.9	2.9	1471
Chinna edlagadi	7.98	1176	31	4.5	1.3	1388
Circar channel	7.41	1219	27	2.9	4.3	1838
Srugavarappadu	7.42	1304	30	2.7	4.0	1788
Kolleti kota	7.47	1256	27	3.1	4.0	1775
Gudivaka lanka	7.32	1688	27	3.9	2.4	2063
Kokkirayalanka	7.49	1781	30	3.7	3.0	1850
Chettunnapadu	7.37	1599	28	4.1	1.8	1738
Upputeru	7.42	1443	34	2.9	3.8	2075

Note: All values are expressed in mg/lit except pH and T. Coli. T. Coli is expressed in MPN/100 ml.

20.13 Trends of Dissolved oxygen and BOD values for the years from 2010 – 2014:

Inlet Drains of Kolleru

Table 21: Trends of Dissolved oxygen and BOD in Inlet of Kollern Lake

Kolleru Lake Sampling Points	DO (mg / L)					BOD (Mg / L)				
	201 0	2011	2012	2013	2014	2010	2011	2012	2013	2014
West Thammileru	1.1	2.3	7.1	5.6	2.6	6.1	1.1	1.2	1.8	3.9
Budameru	2.6	3.3	4.1	2.0	3.8	6.5	0.8	1.6	2.9	2.9
Chandraiah drain	1.8	3.6	5.3	2.0	1.8	7.2	0.6	1.8	3.4	3.8
Polaraju drain	1.6	2.9	2.5	3.5	4.8	6.8	1.0	1.8	2.6	2.6
East Thammileru	3.2	4.5	7.2	6.1	4.8	5.6	0.7	1.0	1.5	2.1
Bulusu vagu	5.8	3.5	7.1	4.4	3.6	7.0	0.7	1.8	3.0	2.7
Mondikodu	6.1	5.3	7.5	6.2	4.1	2.8	0.5	1.2	1.4	2.5
Kovvali drain	7.2	5.7	7.2	5.6	4.8	3.2	0.6	1.2	1.7	2.1
Tokalapalli	8.6	4.2	5.1	5.3	5.1	2.2	0.6	1.2	1.4	1.8
Pandikodu	3.8	3.0	7.1	4.5	3.6	6.8	1.1	0.8	2.8	2.7
Narasannapalem	4.1	5.3	5.0	1.9	3.1	5.8	1.2	1.8	3.4	3.2

Outlet Kolleru Lake Points

Table 22: Trends of Dissolved oxygen and BOD in Outlet of Kollern Lake

Kolleru Lake Sampling Points	DO (mg / L)					BOD (Mg / L)				
	201 0	2011	2012	2013	2014	2010	2011	2012	2013	2014
Pedda edlagadi	0.6	1.6	7.6	2.6	2.9	5.6	1.0	1.0	2.6	3.9
Chinna edlagadi	0.8	0.6	1.5	4.1	1.3	7.9	1.1	2.6	4.1	4.5
Circar channel	3.2	1.5	5.4	2.9	4.3	11.0	1.1	2.6	2.9	2.9
Srugavarappadu	2.1	1.1	6.0	3.2	4.0	10.6	0.8	1.8	3.2	2.7
Kolleti kota	2.4	0.6	5.5	2.9	4.0	11.2	1.2	2.2	2.9	3.1

Gudivaka lanka	0.8	2.8	2.6	3.8	2.4	10.8	1.2	3.8	3.8	3.9
Kokkirayalanka	2.2	0.6	3.0	3.5	3.0	11.8	1.0	2.6	3.5	3.7
Chettunnapadu	0.2	1.8	5.8	4.0	1.8	13.0	0.8	1.6	4.0	4.1
Upputeru	3.1	1.9	5.9	3..3	3.8	6.6	0.9	1.6	3.2	2.9

Note: All values are expressed in mg/lit.

Inferences from the data: The data of annual averages obtained for Kolleru lake for the years from 2010-2014 shows that water is not suitable for the purposes mentioned against Class A, B, C and D, i.e. to use as drinking water source, for bathing purpose and propagation of fisheries and wild life because of low DO (4 mg/l) content.

20.14 Status of water quality of Bay of Bengal along the coast line of Andhra Pradesh for the year 2014-15

Table 23:Status of water quality of Bay of Bengal along the coast line of Andhra Pradesh

S. No.	Sample Description	DO	pH	TSS	BOD	NO3 -N	NH3 - N	Total PO4
1	Confluence point of river Vamsadhara at Kalingapatnam	6.6	7.8	46	1.7	0.5	0.3	0.7
2	Confluence of river Nagavali at Peda Ganagalavani peta	6.7	7.9	31	1.7	0.09	0.21	0.83
3	Confluence of marine outfall of M/s Dr.Reddy Labs Ltd., & M/s Aurobindo Pharma Ltd., Pydibheemavaram	6.8	8.1	80	1.3	0.1	0.1	0.58
4	Confluence of marine outfall of M/s Matrix Laboratories Ltd., Thammayyapalem.	6.7	8.1	24	1.1	0.17	0.07	0.02
5	Confluence of marine outfall of M/s Divi's Laboratories Ltd., Chippada	6.7	7.8	26	1.2	0.95	0.4	0.7
6	Confluence point of Gosthani river joining the sea near Bheemili municipal office	6.9	8.0	30	1.2	0.19	0.42	0.84

7	Confluence point of Gambheeram Gedda joining the sea near Excel Hatcheries, Mangamaripeta, Bheemili Road.	6.8	8.0	29	1.4	0.94	0.4	0.78
8	Confluence point of Sewage joining the sea at Shanti Ashramam.	6.7	7.9	48	1.4	0.7	0.41	0.81
9	Confluence point of Sewage joining the sea at Fishing Harbour.	6.5	7.9	53	1.3	0.9	0.7	0.69
10	Sea water collected at Visakhapatnam Port Trust jetty near Marine Department.	6.7	7.7	65	1.3	0.75	0.9	1.9
11	Confluence of sewage of lavender canal joining the sea at harbour	6.8	7.9	43	1.3	11.5	1.48	1.88
12	Confluence point of Mehadrigedda surplus coarse along with all the industrial effluents joining the sea at parallel bridge near dockyard.	6.9	7.9	39	1.3	0.09	0.85	9.2
13	Confluence point of steel plant effluent joining the sea at Gangavaram creek near Dibbapalem.	6.6	8.0	33	1.2	0.14	0.24	0.47
14	Confluence point of steel plant effluent joining the sea near Appikonda village	6.5	8.1	25.1	1.2	0.63	0.21	0.59
15	Confluence point of Mutyalammapalem gedda Joining the sea at Mutyalammapalem near NTPC.	6.7	8.0	30	1.2	0.53	0.26	0.64
16	Confluence point of River Sarada and River Varaha at Bangarammapalem	6.5	8.0	45	1.3	0.16	0.29	0.38
17	Confluence point of River Thandava at Pentakota	6.7	8.0	38	1.3	0.24	0.26	0.52
18	Sea water collected near Uppada, Kakinada	6.8	8.0	31	1.3	0.39	0.26	0.64
19	Sea water collected near Kumbhabhishekam temple, Kakinada	6.8	7.7	27	1.2	0.35	0.47	1.16
20	Sea water collected near Deep water port, Kakinada (1 km away from jetty)	6.8	7.7	32	1.2	0.07	0.84	1.31

Note: All values are expressed in mg/lit except pH.

S. No.	Sample Description	DO	pH	TSS	BOD	NO3 -N	NH3 - N	Total PO4
21	Sample collected from Upputeru channel Opp.Circle Telecom Training Centre, Kakinada	7.1	7.6	28	1.3	0.16	0.99	1.14
22	Sample collected from Upputeru channel near Indrapalem, Kakinada (Confluence of East Eleru drain and Bikkavolu drain)	6.8	7.3	38	1.2	0.42	0.82	1.12
23	Confluence point of Chollangi snanala revu and Ramannapalem drain	6.9	7.8	32	1.2	0.11	0.38	0.81
24	Confluence point of River Gautami Godavari at Bhairavapalem village	6.9	7.9	42	1.3	0.12	0.88	0.68
25	Confluence point of River Vynateya Godavari at Vodalarevu village, near Amalapuram	6.9	7.9	43	1.3	0.11	0.32	0.64
26	Confluence point of River Vashista Godavari at Chinnamynavanilanka	7	7.7	20	1.2	0.24	0.24	0.39
27	Kothapatnam beach	5.5	8.14	---	0.7	---	---	---
28	Pulicat lake-Bheemulavaripalem	5.0	8.00	---	0.8	---	---	---
29	North Extent - Kothapatnam beach	5.7	8.01	---	0.7	---	---	---
30	Soth Extent - Kothapatnam beach	6.0	8.04	---	0.6	---	---	---
31	Loading Point - Kothapatnam beach	5.7	8.04	---	0.8	---	---	---
32	Fishing Harbar after confluence with Sea, Nizampatnam	5.8	7.88	---	1.2	---	---	---
33	Fishing Harbar, Nizampatnam	5.8	7.97	---	1.1	---	---	---
34	Suryalanka Beach	5.7	8.08	---	0.7	---	---	---
35	Vadarevu Beach, Chirala	6.3	8.16	---	0.7	---	---	---

36	Upputeru after confluence with sea, Etiparru	5.8	7.77	---	0.8	---	---	---
37	Upputeru before confluence with sea, Pedatadika	5.8	7.90	---	0.7	---	---	---
38	Manginapudi beach, Machilipatnam	5.9	7.98	---	0.7	---	---	---
39	River Krishna at confluence with sea at Palakayathippa beach, Hamsaladeevi	5.8	7.82	---	0.6	---	---	---

Note: All values are expressed in mg/lit except pH.

20.15 Water quality of River Godavari and its tributaries

Annual average values of water quality monitoring results for the year 2014-15 are as follows:

Table 24: Water quality of River Godavari and its tributaries

S. No.	Code	NWMP Station	pH	TDS	DO	BOD	Hardness	T. Coli	F
01	0014	Polavaram	7.82	176	5.6	1	109	143	0.50
02	2370	U/s of Nalla channel, Rajahmundry	7.43	174	5.3	1	96	178	0.40
03	2371	D/s of Nalla channel, Rajahmundry	7.33	190	5.4	1	106	131	0.40
04	1218	U/S of Rajahmundry, (Kumaradevam)	7.84	178	5.5	1	84	260	0.40
05	3067	After joining the outlet of STP, Dhawaleswaram, Rajahmundry	7.5	213	5.3	1.1	---	---	---
06	1219	Rajahmundry D/S (Dawaleshwaram)	7.56	194	5.3	1	95	210	0.41

Note: All values are expressed in mg/lit except pH & T. Coliform (MPN/100 ml).

Inferences from the data: The data of annual averages obtained for river Godavari at 5 points is compared with that of the standards laid down in Primary Water Quality Criteria classification for the designated best use by the Central Pollution Control Board (annexure). The results suggests that Godavari river water falls under Class C, which is suitable to use as drinking water source with

conventional treatment followed by disinfection and bathing purpose (Class – B).*** (Here ends the data from APPCB Draft Report 2014-15)

In general, in terms of the health of the rivers in Andhra Pradesh and Telangana the question is almost all its rivers are in the list of polluted rivers, and in terms of interventions on the rivers and river systems, there is not a single river that has not been meddled with in the two states, which continue to build reservoirs and medium and major irrigation and multipurpose projects and continue to fight over rivers. Musi is a fine example of a river destroyed by unplanned development and total apathy for a water source that was once the pride of Hyderabad. It remains a swamp, nearly dead in terms of its flow and this is a river which had once risen in spate during the Nizam rule, a history that is nearly forgotten. Nakkavagu brought fame to Patancheru in Greater Hyderabad (of today) for pollution, with numerous studies and research teams across the world coming out with their analysis of the same. It was one of the most studied and recorded pollution stories in recent times. And all the studies pointed out this was entirely the result of the industrial waste that was dumped untreated The total encroachment of smaller rivers and natural lakes in and around Hyderabad by real estate projects gave Hyderabad its Chennai moment recently with the unprecedented rains of the season. Nearly the entire stretch of Greater Hyderabad was built on landfills. Manjeera, Musi, are rivers that have been forcibly imprisoned in this metro which aims to mimic Shanghai sometimes and Singapore at others, depending on the whims and fancies of its Chief Ministers in power at different times.

21. Other Threats

21.1 Threat to River Krishna by the new planned capital of AP called Amravati

Source:http://timesofindia.indiatimes.com/city/hyderabad/Plan-to-save-Amaravati-from-Kondaveeti-Vagu/articleshow/54516033.cms#

Hyderabad: With flood threat looming large over upcoming capital city Amaravati the Andhra Pradesh Capital Region Development Authority (APCRDA) has proposed to de-link notoriously hilly stream Kondaveeti Vagu from Guntur Channel in a bid to mitigate losses. Kondaveeti Vagu that empties into river Krishna upstream of Prakasam barrage is linked to Guntur Channel, which is at a slightly higher plane. Officials realised that separating Kondaveeti Vagu from Guntur Channel would prevent flooding of areas in the capital city to a large extent. They have also proposed to pump out water from the stream into the Krishna in case of a heavy flood discharge. The APCRDA will submit the latest proposal to National Green Tribunal (NGT), which is hearing a batch of petitions related to the capital city. Guntur Channel supplies water to Guntur city and provides irrigation to about 23,000 acres in the district. The popular belief is that Guntur Channel draws water from the Prakasam barrage directly. In reality, Kondaveeti Vagu is the

connecting link between Krishna river and Guntur Channel. There was no problem with the stream before the construction of the barrage. It began flooding the region after the barrage was constructed and was linked to Guntur Channel. The backwaters of Kondaveeti Vagu inundates large tracts of land. Even 20 mm rainfall leads to flooding. On average 750 cusecs of water flows into Guntur Channel from Vagu daily. The APCRDA has proposed a new sluice at Prakasam barrage to delink the channel from Vagu. The project may not cost more than Rs 50 lakh. Construction of a sluice will limit inundation to just 3,000 acres. Officials have also proposed diversion of flood water from Vagu to Krishna's western main canal. "In case of extreme floods both in the river and Vagu, flood water from the stream can be pumped into the barrage," said ISN Raju, a member of the expert committee on Kondaveeti Vagu.

The flood control plan was submitted to APCRDA's lawyers for submission before the NGT.

The Natural City Master plan for Amaravati preserved the floodplain to use it as a perennial source of quality water for the inhabitants of the city.

Noted urban planning experts Vikram Soni and Romi Khosla have asked the Andhra Pradesh government to push the seed capital inland and not build it on the floodplain of Krishna River in accordance with the Master Plan prepared by a Singapore based company. Theoretical Physicist and Delhi Jal Board Advisor Prof Vikram Soni released a book "Amaravati Natural City" he co-authored by well-known international architect and national consultant on urban planning Romi Khosla in a programme organised by farmers and agricultural labourers of Amaravati Area here on Tuesday.

Explaining the concept of Natural City along with Indian Society of Landscape Architects (ISOLA) former president Suchin Jain, Prof. Soni said "cities should be able to manage themselves and be self-sustaining."

Building on the floodplains of Adyar and Coovam Rivers in Chennai and earlier in the Mithi River in Mumbai had led to siltation and clogging of the waterways. This had caused the floods that resulted in loss of life and property, Prof. Soni said. The building of embankments or bunds, without exit routes for water caused long-term inundation in Srinagar. Uttarakhand floods were also caused because of encroachments in River Zones, he said. The Natural City Master plan for Amaravati preserved the floodplain to use it as a perennial source of quality water for the inhabitants of the city. The natural plan would also preserve its agricultural activities by shifting the location of the seed capital to a higher ground along a new water way, an artificial canal between the floodplains and the seed capital.

Former administrator of Chandigarh and retired IAS officer M.G. Devasahayam said urban planning had undergone revolutionary changes in the second phase of Chandigarh expansion. What was learnt through experimentation and experience in Chandigarh was already included in the Amaravati Natural city Master plan. Amaravati Farmers leader Anumolu Gandhi said that the concept of Natural city would be taken to the farmers and through them pressure would be put on the government to implement it. He said copies of

the Natural Master Plan would be given to the Chief Minister and the CRDA commissioner.

Source: http://thewire.in/58016/amaravati-an-example-of-flawed-urban-policy/

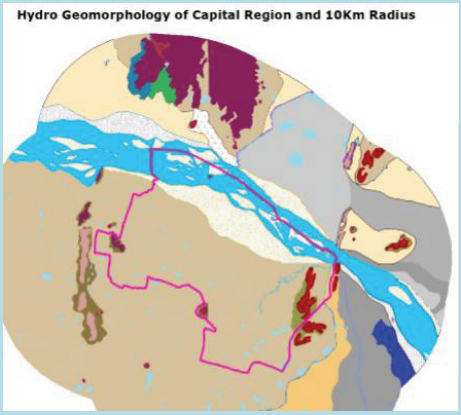
On August 10, the National Green Tribunal heard a report raising objections to Amaravati, the new capital city of Andhra Pradesh planned by the state government – the Chandrababu Naidu-led Telugu Desam Party. Delhi-based architect Romi Khosla and physicist Vikram Soni, who have been working on their concept of the 'natural city' since 2014, say that their concept presents a new model for Asia's urbanisation. They collaborated with Satyanarayana Bolisetti, an activist from Andhra Pradesh who has been fighting for farmers' rights and the protection of river floodplains, on the report. It argues that Amaravati's planned location on the southern floodplains of the river Krishna violates laws, making the city environmentally unsustainable and potentially dangerous for human life. Khosla and Soni have designed an alternate Amaravati, or 'Amaravati Natural City', and have submitted these plans to Naidu's office, which has not yet responded.

A global and narrow vision - *Using a method called 'land pooling' – that has been criticised by farmers, activists and others – the Naidu government has acquired over 30,000 acres of land on the southern banks of the river Krishna. It promises a 'world-class' capital city in the style of Singapore or Dubai , with glittering corporate and government buildings overlooking the river, wide avenues, a golf course, high-rise residential complexes and malls and casinos on islands in the river. The Singapore-based firm Subarna Jurong prepared the master plan for Amaravati. This particular vision is unsurprising and far from original. It is in line with the corporate-driven, trickle down model of development that international consultant organisations such as the McKinsey Global Institute and Scott Wilson have recommended India follow in the coming decades, and that the Narendra Modi government has adhered to. Khosla has addressed Mckinsey's recommendations in its report, India's Global Awakening, in an article he wrote in* Economic and Political Weekly. *Writing about establishing industrial corridors, mega-cities and high-speed rail lines and roads, Khosla warns: "The enormous footprint and mega presence of new projects does not address the critical factor of ecological balance through self-sufficiency in a global environment which is struggling to fight climate change. The implementation of these projects in the form planned in these reports will destroy precious natural environmental resources, while at the same time snatching what remains from existing users by impoverishing villages and farms."*

As Khosla, Soni and several other experts have been pointing out, mega-cities require enormous – unsustainable – amounts of energy and resources to build and to run, while destroying precious natural environments and local livelihoods. Amaravati promises to be but the next example of this kind of flawed urban policy. The BJP-led government has so far supported Naidu's extravagant Amaravati, despite two government-backed reports questioning many of the city's aspects and Andhra Pradesh itself mired in debt. In 2014, the Union government formed a committee under the Andhra Pradesh Reorganisation Act 2014,

headed by K.C. Sivaramakrishnan and comprising urban planners and design experts, to explore site options for the new capital city. In August, the committee recommended that the Andhra Pradesh government focus on long-term development through building a larger landscape of cities and towns, rather than building a single 'super-city'. It also said the large-scale takeover of fertile agricultural land was unfavourable, as this would lead to a lack of food security in the long run. In December, the Andhra Pradesh Capital Region Development Authority Act 2014 or APCRDA established a group by the same name. The Andhra Pradesh Capital Region Development Authority was the body authorised to conduct the land pooling and build the city. The APCRDA commissioned Tata Consulting Engineers to issue an environmental impact assessment (EIA) report. When published, the report included a number of directives for the state government, including that the construction and subsequent functioning of Amaravati would not cause any environmental damage. Despite these recommendations, in September, Naidu announced that the region around Vijayawada, Guntur, Tenali and Mangalagiri – the 'food bowl' of the southern Krishna floodplains, one of the most fertile agrarian strips in the country – would be the location of the state's new capital city. Khosla, Soni and Bolisetti contend that apart from being environmentally, economically and socially destructive, the Naidu government's plans are in clear violation of the recommendations made by both the Sivaramakrishnan committee and the EIA. They claim that their Amaravati Natural City is an alternative to Naidu's Subarna Jurong Amaravati, and also a model for a new kind of Indian city as the country continues to face water scarcity and climate change – a city that demonstrates how humans can live healthily and harmoniously with nature.

Playing with water - *The stretch along the Krishna on which Amaravati will be built is a highly fertile floodplain – or a catchment area that replenishes itself naturally during rainfall and flooding, maintaining the water level of the soil, as well as the flow and ecology of the river, by continuously absorbing and discharging water. Constructing on a floodplain would destroy that natural system of absorption and discharge and severely raise the risk of flash flooding, Khosla and Bolisetti explain. Several recent disasters have been the result of encroachment – buildings, roads, dams and embankments – on floodplains: the flooding of the Adyar and Coovam rivers in Chennai, of the Mithi river channel in Mumbai, in Srinagar and in Uttarakhand. Building Amaravati on the Krishna floodplain is akin to asking for a repeat of one of these disasters. However, rather than being a threat to human life, floodplains could in fact be a resource – as long as they are allowed to replenish and balance themselves. Soni explains that floodplain water is one of the last unpolluted sources of water for Indian cities: the water extracted from a floodplain is pure, since it comes from the late monsoon flood, which annually flushes out the pollution in the river. Instead of destroying the floodplain with buildings, as the government-backed Subarna Jurong would do, Khosla, Soni and Bolisetti's version of Amravati has planned to preserve two and a half kilometres of floodplain on either side of the Krishna. The preserved floodplain will easily yield an annual 60-75 million cubic metres (MCM) of water, which will be adequate for a population of a million people. The value of this yield at today's prices can be taken as Rs 900 crores a year, in itself a great economic benefit.*



Delhi is already using this non-invasive method to obtain 56 MCM of water a year, drawn from a 20 km length of the northern Yamuna floodplains. The Delhi Jal Board, under chairman and water minister Kapil Mishra, plans to increase this supply to 100 MCM a year. In a booklet on Amaravati Natural City, published in both Telegu and English and distributed to farmers, Khosla and Soni write of the severe and numerous water scarcity problems that India faces: polluted and overdrawn rivers, groundwater depletion and invasive dams. The International Water Management Institute has categorised India as a 'water stress zone' and indicated that 33% of India's rivers are severely or moderately polluted across their entirety. India and China are the world's largest countries with water stress, which will only become an irreversible catastrophe unless careful action is taken to conserve and manage water. Khosla and his colleagues contend that urban planning in India needs to confront and work with the realities of water scarcity. Projects based on the 'McKinsey model' – Amaravati and others undertaken and planned by the BJP government – do just the opposite.

Playing with lives - *Naidu's government has been presenting Amaravati as a capital city 'for all' – as India's first urban centre of truly global standards. But farmers, activists and others have been questioning the government's motives and methods, asking just who the new city will benefit. In a presentation in Delhi in July 2016, Khosla and Soni described how the land chosen for Amaravati is currently the source of a vibrant agro-economy that yields Rs 1000 crore per year, with complete linkages from farm to market and many participating women entrepreneurs. The soil here is so rich that over 20,000 farmers in the 29 villages grow three or more crops annually and more than 120 varieties in total. Even marginal farmers who own half an acre or less earn more than Rs 30,000 each month. The destruction of the Krishna floodplain for the construction of Amaravati would mean the destruction of this rich local economy and these livelihoods. In December 2014, the Andhra Pradesh government began its own unique process of 'land pooling' to acquire the 30,000 acres required for Amaravati. Ever since it started, farmers and others have claimed that the terms on which the pooling is taking place are economically unfair for farmers and that the government's methods in convincing farmers to give up their lands coercive. They have pointed out that the APCRDA is solely comprised of businessmen and that there is a total lack of transparency and representation of the real stakeholders in the decision-making. Following the start of land pooling,*

Bolisetti, who was contesting for the position of MP from the Visakhapatnam Lok Sabha constituency at the time, wrote a letter to Naidu elaborating on all the reasons why constructing the capital city where planned was such a bad idea. The National Alliance of People's Movement (NAPM), a network of social activists, has been spearheading the opposition since. In January 2015, it alleged that the Naidu government has a "hidden agenda". Former IAS officer M.G. Devasahayam, who led a fact-finding team of NAPM for investigating the 29 villages within the planned capital region, said that the APCRDA Act was "introduced in the Assembly overnight and passed [with] no public consultation", and was "against the Constitution and… violative of the Land Acquisition Law of 2013". NAPM also organised a national convention in Delhi, in January 2015, in collaboration with the All India Union of Forest Working People, Delhi Solidarity Group, Jan Adhikar Sangharsh Samiti and other groups, to oppose the BJP government's Land Ordinance Bill, which withdrew certain requirements in land acquisition for certain projects, such as the Social Impact Assessment and consent of land owners. The Bill lapsed in August and never came into being, but, as Bolisetti points out, the question of the constitutionality of the APCRDA Act, which is based on the Bill, and the method of land acquisition it allows, remains. These farmers and critics have been questioning how the Andhra Pradesh government can proceed with a project that affects lakhs of individuals without real participation from those very people, is clearly environmentally destructive and finally how the Union government can back it. Amaravati is destructive and inequitable in its very conception and creation and promises to remain so after it is built. A city like Amaravati – of glass, steel and concrete, posh centres and poor peripheries, flyovers connecting peripheries to the centre, malls and high-rise complexes – is friendly only to those who want and can afford the consumerist lifestyle that will feed such a city and who can afford to avoid the waste and pollution that will result from it. Moreover, as Khosla and Soni write, "Asia cannot copy the industrialised countries which have stable cities, landscapes and populations. In Asia there is too much poverty, unemployment and immigration."Although the authors do generalise about the vast and varied region of Asia here, their insights make meaningful the fact that many of Asia's cities, including Delhi and Mumbai in India, have become invasive, feeding their own cycles of poverty and pollution. The Subarna Jurong city promises to turn into another such invasive mega-city. It presents no sustainable or equitable alternatives. Through their concept of the 'natural city', Khosla and his colleagues have been arguing that urban spaces in India need to be planned so as to be in balance, with themselves and their environments – to be 'natural' rather than 'invasive', in the sense that "all living organisms maintain a steady state reflected in their internal equilibrium". In other words, India needs to fundamentally redefine and redesign its idea of urbanisation to cohesively address the problems of climate change, resource and energy scarcity, social inequity and poverty.

Some positives - *There are some features that demonstrate the city's internal equilibrium and cohesiveness in values and practice – the simultaneous preservation and use of the Krishna floodplains and its waters is one such feature. Another positive feature is its checkerboard layout. In Khosla and Soni's blueprint, built spaces alternate with open spaces of farms, pastures, orchards and forests, each block is two kilometres squared. The urban farms, pastures and orchards, irrigated by the city's treated wastewater, will make the*

city self-sufficient in vegetables, fruits and dairy products. And such a layout will ensure 'green convention' – pulling cooler air from the green spaces into the warmer built areas – and bring down the overall temperature of the city by two or three degrees, just one of the many ways the city will be energy efficient and run on the principle of recycling rather than consumption and waste. At the same time, the city's checkerboard design will work towards diversity in jobs and social groups, as individuals in occupations traditionally considered 'rural' or 'urban' will live side-by-side. This will in turn contribute to entrepreneurial innovation and talent as new climate, water and landscape-related jobs are created. In a report on the Modi government's Smart Cities project, Khosla writes: "…the new Smart Cities [are] primarily the product of a global financial imagination where mobile capital can describe its own deals and then descend to feed off them before moving on… A smart city is a giant corporation within which there are small-er corporations and within which there are still smaller sub-corporations all of whom have invested in the city and whose investments are at stake … For the Government of the day, Smart cities are a symbol of a new future for India in which the freedom of fulfilled aspirations will be guaranteed to those who migrate and get employed and integrated into the prosperity and values of a new industrialised future… where corporations provide finance, policy guidance and political options. This is a global venture."

How will Naidu's 'world-class' capital city 'for all' avoid being this kind of disaster?

22. Erosion – Krishna

Source: http://indiasendangered.com/erosion-of-krishna-river-bed-poses-threat-to-ecosystem/

Krishna river is one of the longest rivers in central-southern India also known to cause heavy soil erosion during monsoons. During the months from July to September, the river's flow is so strong that it may often reach a depth of over 75 feet (23m). But the present erosion is a cause of concern for environmentalists as it may pose threat to the aquatic life and the mangrove forests lining the river beds. The present erosion has caused damage along the river bed in the Krishna district as well as the Guntur district of Andhra Pradesh. On the Krishna district side of the river bed, erosion has resulted in the widening of the Krishna River adjacent to Salempalem and Kottapalem villages. Bobbarlanka and Piratlanka areas of Guntur district area are facing threats to their river bed ecology. Damage due to erosion has been observed and reported by local boatmen too who have reported of mud on the bank of the river slipping during storms when the sea gets rough and due to tidal action. As per the locals, in the past five years, the river width has increased by 50 to 70 metres. Andhra University Geology Professor N. Subba Rao says, "The changes in sea water level and high tidal waves near the confluence point must be causing erosion."

If soil erosion continues, a number of aquaculture ponds that exist in the vicinity are likely to be affected. The increase in salinity of the ground water will increase salinity of these ponds as well affecting the aquatic life. The cost of maintaining and managing the salinity in the water would be very high. The

Mangrove forests of Krishna river bed are also threatened due to cyclonic storms and human intervention. The local community living in coastal areas particularly fishermen, use the mangroves for firewood, fencing materials fodder, house construction and grazing. In nature, the floating root systems of the mangrove plants have a crucial role to play in protecting the land and providing feeding and breeding grounds to aquatic creatures. Mangroves are ideally suited to protect the river bed from erosion. They serve as barriers to coastal storms, conserve the soil, support sustainable fisheries, provide medical products and fuel wood and fodder, are habitats of wide range of flora and fauna, and act as nature's ecological security system in coastal estuaries. If the beds are washed away due to erratic nature of the Krishna river, there is therefore much to lose ecologically as well as commercially in these parts of India.

22.1 Sand Mining: NGT Issues Notice To AP and Telangana Governments, among others

(Source: The Hans India, Hyderabad)

New Delhi: *The National Green Tribunal has issued notices to the Governments of Andhra Pradesh, Telangana, Orissa and Maharashtra here on Friday seeking their response to the petition filed with regard to illegal sand mining in the states.*

It also issued notices o the Ministry of Environment and Forests and Krishna River Authority. One Ramesh Babu, a journalist who is associated with Rela, an NGO fighting for the rights of tribals and farmers and former MPTC member K Varalaxmi of Polavaram area, filed the petition citing several violations of rules in sand mining. They contended that the AP Government netted an income of Rs 850 crore through sand sale from 380 sand reaches and this was admitted by Chief Minister N Chandrababu Naidu himself. The Chief Minister had also mentioned in a press conference that there are several loopholes in sand sale. As for Telangana, illegal mining was rampant in Adilabad, Warangal, Nizamabad, Khammam and Karimnagar districts in about 40 sand reaches. Heavy equipment too was being used in all these areas against the stipulated rules, the petitioners said seeking a halt to the same. They also appealed to the NGT to ensure that the income from sand mining is spent on environmental protection and was not used for other purposes. Justice Swatantra Kumar and technical member Prof. Yousuf heard the petition and adjourned the case to January 7. Advocate Sravan Kumar appeared for the petitioners.

22.2 Thermal Power - AP, Telangana

'Environment clearance not sought for thermal power plant'

http://www.thehindu.com/news/national/telangana/environment-clearance-not-sought-for-thermal-power-plant/article7857630.ece Updated: November 8, 2015 05:39 IST

The Human Rights Forum (HRF) has alleged that construction activity was going on at the site of the Telangana State Power Generation Corporation Limited's proposed 1080-MW Bhadradri Thermal Power

Project on the Manuguru-Pinapaka borders without the mandatory prior environment clearances.

V.S. Krishna, general secretary, HRF, Telangana and Andhra Pradesh States, said construction in any manner cannot go ahead for such a thermal power plant, classified as Category-A project, without the environmental impact study, the mandatory public hearing and the necessary appraisal by the Ministry of Environment, Forests and Climate Change (MoEFCC).

How Telangana is breaking the law to build a power project

http://scroll.in/article/801040/how-telangana-is-breaking-the-law-to-build-a-power-project

The Bhadradri Thermal Power Plant is being constructed despite the absence of environmental clearances and a stay from the National Green Tribunal, activists say.

Dec 28, 2015 · 09:15 am Updated Dec 28, 2015 · 03:58 pm

Ayesha Minhaz

An excavator dug up the earth in an open ground outside the town of Manuguru, around 300 kilometres north of Hyderabad. Trucks moved in and out, kicking up clouds of dust, as workers operated crushers and construction continued at full swing. The Telangana government wants to build a 1,080 megawatts coal-fired thermal power project here. Activists have opposed the Bhadradri project on the grounds that it would cause social and environmental damage in the tribal-dominated, forested district of Khammam. Besides, they say, the proposed technology is not encouraged by the Ministry of Power for environmental and efficiency reasons.

The project is yet to get environmental clearance from the Union Ministry of Environment and Forests. Under India's laws, construction of an industrial project cannot begin without environmental clearance. Yet, the Telangana Power Generation Corporation has disregarded the laws and begun construction on the site, allege activists of the Human Rights Forum. On December 15, based on the evidence submitted by the activists, the National Green Tribunal put a stay on further construction. But, when this correspondent visited the site on December 24, excavators, trucks, crushers were still at work, despite the stay. The chairman and managing director of the Telangana Power Generation Corporation, D Prabhakar Rao, claimed the construction was not directly related to the project. "Whatever is going on at the site is preparatory work like erection of boundary walls, which has been taken up to reduce the delay in the overall time," he said. "We know that the work can't be started without the Environmental Clearance. We will obtain it soon and start the work."

But local residents and activists point out that the machines are at work deep inside the plot of land and not at its periphery. Once the boundary wall is complete, they say it would be impossible for anyone to keep

track of the activities inside the project site.

When a government company violates the law

The continuing construction, the activists say, amounts not only to a violation of the National Green Tribunal's orders, it breaks three laws: Water (Prevention and Control of Pollution) Act, Air (Prevention and Control of Pollution) Act, and the Environmental Impact Assessment Notification, which is a sub-legislation of the Environmental Protection Act. "The moot point here is the Telangana Power Generation Corporation is committing illegalities," said VS Krishna, general secretary of the Human Rights Forum for Andhra Pradesh and Telangana. "Whoever is responsible should be made accountable for it."

Under India's laws, a state government body called the Pollution Control Board is responsible for enforcing environmental regulations. The Bhadradri project is being set up by the Telangana government, and the board appears to have relaxed its scrutiny.

"The environmental regulatory regime in Telangana state is in wilful slumber," said Krishna. "By their inaction, the pollution control board and other officials are legitimising illegal activity. They too must be held criminally liable."

When asked for a response to the allegations of inaction, the Pollution Control Board Member Secretary responded with: "Speak to the Telangana Power Generation Corporation."

Why is Telangana in a hurry?

The government has justified the rush to build the project with the argument that the state badly needs the power. According to state government officials, Telangana incurs a steep financial burden because it buys power from other states. "The state has an acute shortage of power supply and the project is to meet the demand [for electricity]," said Rao. "The present requirement in the State is around 7,300 megawatts whereas the capacity available is only 4,300 megawatts" wrote the government of Telangana in a letter to Ministry of Environment and Forests justifying the need for the Bhadradri Thermal Power Plant.

But activists question the choice of site for the project. The land in the villages where the project is coming up is highly fertile, double-crop farmland. It is less than a kilometre from the Godavari river and just 10 kilometres from the Kinnerasani Wildlife Sanctuary. The forest department's website boasts that the sanctuary is home to tigers, panthers, sambar deer, blackbucks and is also a breeding ground for marsh crocodiles. As per the pre-feasibility report submitted by the Telangana Power Generation Corporation, ecologically sensitive areas like reserve forests of Cherla, Subbampet, Kondayyagudem, Kalavanagaram, Janapet near Gaddigudem village and Venkatraopeta fall within 15 kilometres of the project boundary. There has been no study report yet on the ecological consequences of drawing water from the Godavari

river.

The clearance process

In the project proposal it submitted to the Expert Appraisal Committee of the Ministry of Environment, the Telangana Power Generation Corporation set a deadline of two years for building the project. It obtained the terms of reference for the project, which is the first step in the process of getting an environmental clearance. The next step would be to carry out an Environment Impact Assessment study, followed by a public hearing where local people would be given a chance to air their views on the project. Only after the completion of the hearing can the Ministry of Environment decide whether to give the project environment clearance. In its submission to the National Green Tribunal, the Human Rights Forum pointed out that the project has skipped these steps, and, hence, the process of obtaining clearance should begin from scratch. "With the amount of illegal construction work which has begun already and the resulting changes that have happened to landscape and the prevailing environment, it is not possible to do the Environmental Impact Assessment study according to the Terms of Reference granted," it said.

The Human Rights Forum is determined to approach the National Green Tribunal again.

Uncertainty for locals

Meanwhile, the local people in the area are anxious, with the project throwing their lives into uncertainty. Although three-quarters of the 1,100 acres of land proposed to be acquired for the project is owned by the government, local communities depend on it for farming and livestock rearing. According to surveys done by the Human Rights Forum, the livelihood of nearly 1,200 families will be directly impacted by the project.

Only 800 families are officially entitled to the relief and rehabilitation package, which has been decided without local consultation. Nearly 150 families are yet to get the compensation, which includes assurance of a job to one of the family members. A man in his fifties, who did not want to be named, said he had been given Rs 5 lakh for his two acres farm as part of the relief and rehabilitation plan. "I was told that both my son and daughter will get jobs," he said. "They are graduates. There is not much talk about jobs, but we are hopeful."

As more than a dozen dumpers passed in front of his house in less than 10 minutes, he added, "All I have now is this small house. I will move out soon with my family as there is too much dust and it gets difficult to breathe."

http://www.sustainabilityoutlook.in/news/thermal-plants-pollute-air-water-andhra-pradesh-telangana-578261

Thermal plants pollute air, water in Andhra Pradesh, Telangana

Feb 10, 2015

Deccan Chronicle

Source Url:

http://www.deccanchronicle.com/150208/nation-current-affairs/article/thermal-plants-pollute-air-water

Most government thermal power plants in Telangana state and Andhra Pradesh have been continuously violating basic environmental standards and polluting natural resources including air, ground and surface water. Repeated notices from the State Pollution Control Board, for time-bound action to arrest the pollution, have gone unheeded. Major pollutants from thermal plants are fly-ash and the waste water that is used for cooling the thermal machinery. Fly-ash causes air, water pollution while discharge of waste water into rivers, sea or ponds, kill aquatic beings.

One example is the highly polluting Kothagudem Thermal Power Station. At present, the station has 11 units operating with a total installed capacity of 1,720 MW. Eight of the units are 36 to 48 years old, and are highly inefficient and add to pollution.

"The KTPS plant has not been maintaining the stack standards (it needs to install or maintain electrostatic-predicated bag filters to control fly ash) and the Kinnerasani river is being polluted by fly ash. After issuing several notices and directions for time-bound action, we have forfeited the Rs 5 lakh bank guarantee and have asked for another bank guarantee of Rs 25 lakh," said P. Viswanath, joint chief environmental engineer.

"The level of suspended particulate matter emission should not exceed 150 milligram per normal cubic metre (mg/Nm3). However, our random inspections of KTPS units have revealed that suspended particulate matter level at times has gone up to 1,000 mg/Nm3," said, an environmental engineer of TS PCB. PCB issued over 10 show-cause notices to KTPS between 2007 and 2014 for violating provisions of the Water (Prevention and Control of Pollution) Act 1974 and the Air (Prevention and Control of Pollution) Act 1981. It has also issued specific directions to the company to take time-bound actions to comply with the regulations.

Similar is the case of Narla Tatarao Thermal Power Station in Ibrahimpatnam in Krishna district and Rayalaseema Thermal Power Plant in Kadapa district. "During our regular monitoring of these plants, we found the regular fly-ash standards have been exceeding the standard limits of 150 milligram per normal cubic metre. The authorities of these plants have been insensitive to the notices served. Now we are looking to file court cases and also forfeit bank guarantee," said, a task force official of AP pollution Control Board (AP PCB)

The real time monitoring systems made mandatory by the Central Pollution Control Board to all polluting industries are still in violation by TS and AP Gencos.

Acidic atmosphere turns farm lands non fertile:

A study shows that due to the acidic atmosphere caused by thermal plants, farm lands lose fertility and there is a reduction in farm yield.

Environmentalists estimate that agricultural yield would drop by about 30 per cent because of pollution and destruction of farm lands in the rice bowl state of India.

Sagar Dhara, environmental engineer and consultant for United Nations Environment Programme, referring to a 2013 environmental impact appraisal of the 1,760 MW Ibrahimpatnam thermal power plant located near Vijayawada, said the report estimated that the air pollution-related crop yield losses in a 10-km radius around the power plant amounted to RS 200 crore per annum.

"Vehicular emission and thermal power plants give out acid gases Nitrogen dioxide (NO2) and particulate matter, which, in the presence of normal sunlight, turn lead to formation of ozone (O3). This in turn forms oxygen radicals that damage the crops and are even known to damage the reproductive system of the cattle. It would affect about 15-40 per cent of the farm yield," added Mr Dhara.

23. Some Thoughts on Dams

Anicut over Godavari – called Dowlaiswaram Barrage or Cotton Barrage after Sir Arthur Cotton, the engineer who supervised its construction in the 19th century (it was completed in the year 1852), paved way for the colonial language and engineering enterprise to stay as a legacy even post-independence. The language of river control that Cotton wrote or spoke about at several places, seems to remain in the present time. For instance, "the river must neb restrained from wandering, which, from its having no hard strata in its course, it always does naturally…" (Col. Arthur Cotton, *Profits upon British Capital expended on Public Works in India as shown by the Results of Godavery Delta Works of Irrigation and navigation,* Richardson Brothers, London, 1956, p. 8)

One of Cotton's descendants was treated as a State Guest during YSR's rule in Andhra Pradesh, exemplifying the deification and complete obsession with the engineering enterprise, especially an enterprise to do with building infrastructure over / around rivers.

> 'The colonial anicut created an edifice around the irrigation system which has continued post-Independence of bureaucratic control and dominance of authorities in terms of releasing water (how much, when, etc, decided by the edifice)…The first thing any Chief

> Minister did after coming to power in Andhra Pradesh since the formation of the state in 1956 was to express a kind of despotic…idiom of power over river waters and "bringing the river waters to the people". Brahminical mythology also played a role in this kind of idiom (after several myths associated with Ganga, Godavari, Cauvery and so forth, being brought down or humbled by the sages). The discourse that globalisation (of the 1990s) led to the nature of developments in this region (delta, coastal Andhra) —the idea of dams, and all the rest, including SEZs—needs to be re-visited in the context of another historical truth of this region. In the case of Godavari, changes were already being brought about through state intervention onvariities of local crops, ways of cropping, etc, and introducing varities for a global imperial market…' (R. Umamaheshwari, 2014, When Godavari Comes: People's History of a River, p. 382)

I would add today that the present Chief Minister of Telangana, KCR (as he is popularly referred to) has also internalised the same despotic control-idiom over the rivers and waters of Telangana, exemplified by the massive investments in irrigation projects, not all of which are being hailed by the farming communities for whom they are being ostensibly constructed. But there is also a Mission Kakatiya aimed at reinvigorating tanks in Telangana, but it remains to be seen as to how much are these going to take the glare away from the major rivers of the State, or more importantly, whether these will lead to a no-big-dams policy at some point.

Incidentally, during the most recent copious rains experienced in Telangana-Andhra Pradesh, speaking of the metro city of Hyderabad, most of the localities that were inundated happened to be the newer ones where high rises have come up in the last decade or even more recently on encroached water bodies. The Telangana state government has recently issued a warning to all those who have constructed on water bodies that strict action would be initiated against them. So that is the status of the way rivers and water bodies are, and it is relatively easy to see the real 'threat' to these – even if it is pollution, who caused it; if it is the very nature of use and control over these, who is doing so.