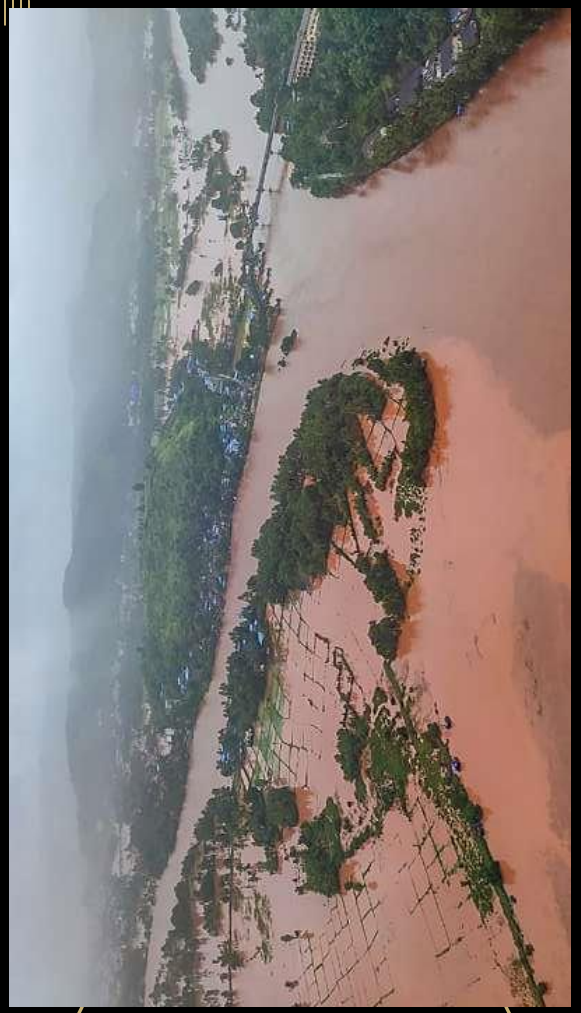
KOLHAPUR FLOODS & DISASTER MANAGEMENT

THE UDAY SEA & COASTAL LEVEL FLOOD LINE SYSTEM

UDAYSINH S. GHATGE

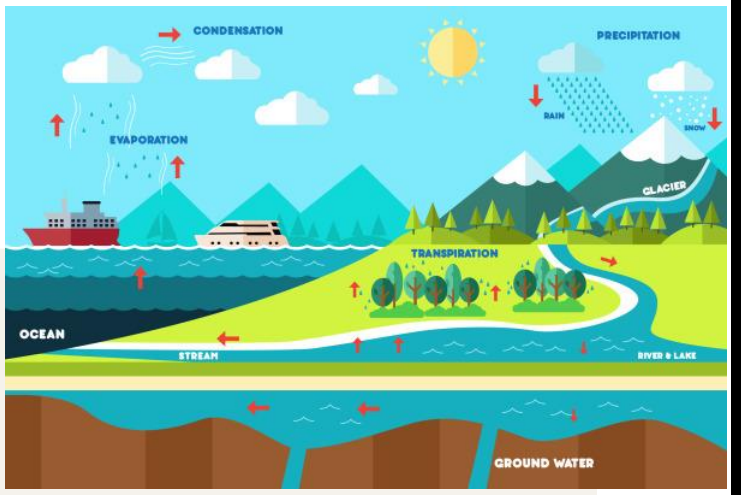
DATE: 2 JUNE 2022



SUMMERY

- During the rainy season of 2019, in the months of July and August, due to heavy rainfall in the Krishna Valley, an unprecedented flood situation had arisen. Sangli and Kolhapur districts in particular were severely affected. There were a huge losses of lives and properties.
- Accordingly, a committee was set up as per Government Resolution dated 23rd August 2019 to find out the causes of floods in Bhima and Krishna valleys in the year 2019 and to prepare future remedial reports. The above committee has so far studied the dimensions of rain and overflow warning, integrated reservoir operation, emergency action plan and mechanism, use of new technology and algorithms for flood control and forecasting and visited the flood affected area of Sangli, Kolhapur district on 23rd and 24th September 2019.
- Krishna Upakho's study report has been submitted to the government. In this report, the committee has made a total of 18 recommendations. The matter of acceptance of the recommendations made by this committee was under consideration of the Government.
- Governance Decision:Krishna Valley Flood Study Committee It has been decided to accept, reject and accept the recommendations of Krishna Upakho's study report submitted to the government on May 27, 2020. Details of the decision taken by the government are given in Annexure "A".

Demography of Kolhapur



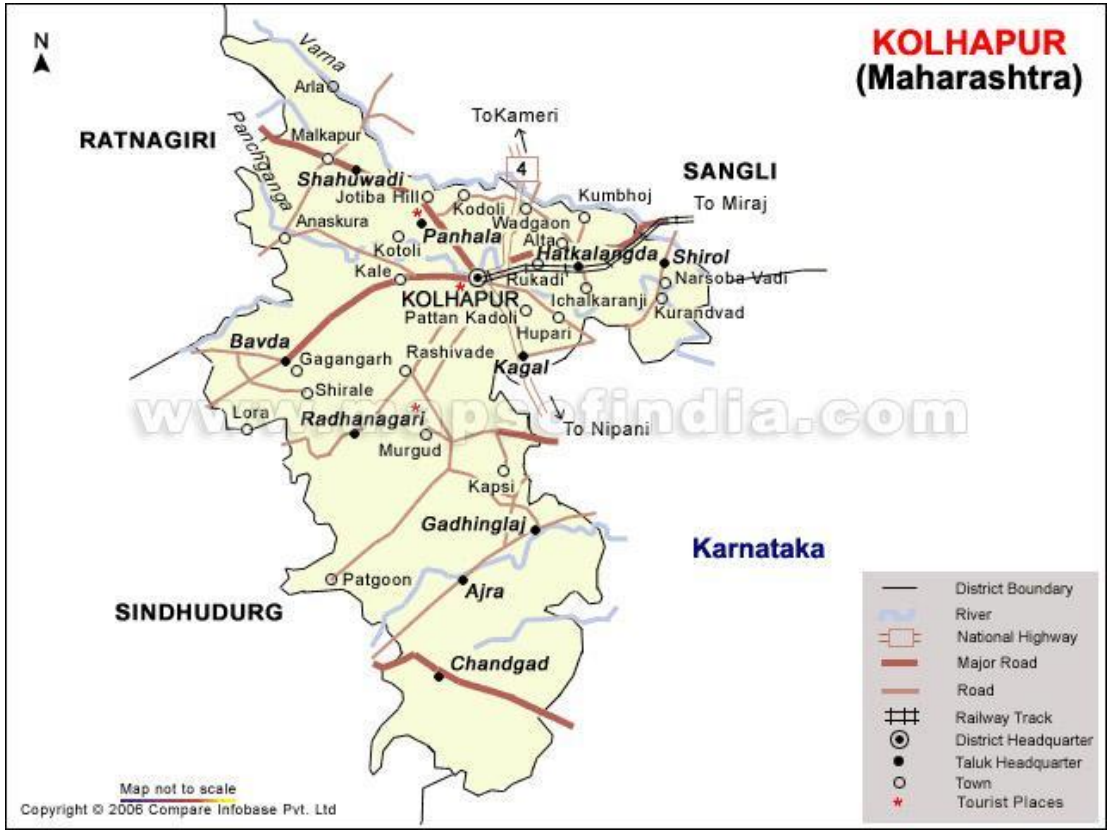
The city is situated at a height of 1790 feet above mean sea level and 16-42 North latitude and 74-14 East longitude. The city stands on the bank of river Panchaganga, a tributary of the river Krishna.

The Kolhapur city is situated at 16.7000 N latitude and 74.2333 E longitude. Stand on a rising ground about 1790 feet above the sea level.

The topography of the city shows many undulations and the ground is generally sloping from south to north towards the Panchaganga River. It has on area of 66.82 Sq.Kms.

In History, Kolhapur the premier State in the Southern Maratha State lies between Latitude 15°73’ to 17°11’ and Longitude 73°75’ to 74°70’. Kolhapur is situated at 546 meter height from sea level and its proximity to the eastern slopes of the Sahyadri renders the greater part of the State almost immune from famine and even from scarcity.

Kolhapur & Sangli Maps




KRISHNA RIVER MAP
MUMBAI
PUNE
HYDERABAD
GHOD
MUSI
BHIMA
SINA
HALIA
AKERU
KRISHNA
NIRA
AWARJA
KAGNA
MUNNERU
VERNA
MON
WYRA
BORINALA
YERI
DON
PANCHGANGA
VENGANGA
PALERU
MALPRABHA
TUNGBHADRA
HINDRI
CHINNA HAGARI
VEDAVATI
VARADA
TUNGA
SWARNAMUKHI
BHADRA
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General causes of Floods in Krishna Sub Basin.

Climate change

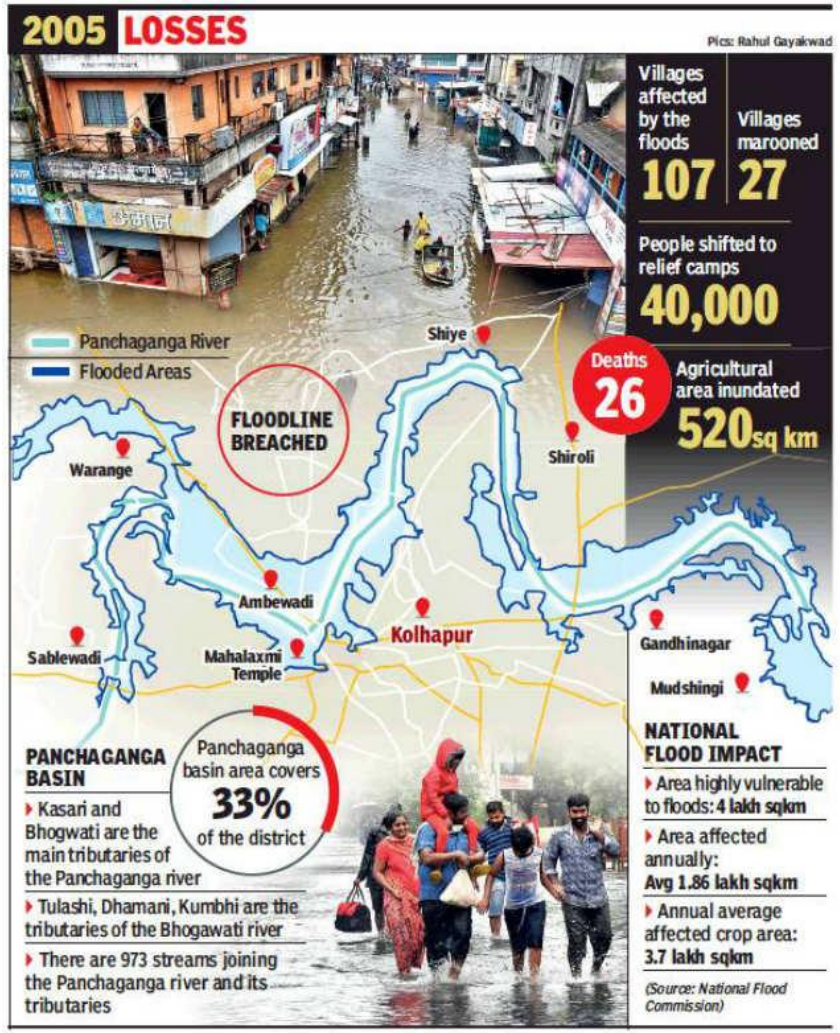
Out of 6 river basin systems, only 55% of the dependable yield is available in the four river basins (Godavari, Krishna, Tapi and Narmada) east of the Western ghats.
The rest drains out in the westward flowing river basins into the Arabian Sea. Over dependency on ground water in a state where its recharge capacity is low, escalates vulnerability of systems dependent on the same such as irrigated agriculture, industries and drinking water. Maharashtra is prone to drought and floods.
Out of the total geographical area of Maharashtra, 40% of the area is drought prone and 7% is flood prone. Rainfall trends indicate that Maharashtra could face an increase in rainfall variability, including drought and dry spells, as well as increased likelihood of flooding in the future
This has direct bearing on ground water as heavy intensity rainfall gets lost as runoff while low intensity rainfall which contributes to recharge decreases in frequency.

Loss Justification

Due to the floods there were several losses in the districts of Kolhapur and sangli in the **2019 monsoons**, **54 people had died,** thousands of cattle were washed away and there was extensive damage of property and crops, due to the flooding of the Panchganga River in Kolhapur and Sangli districts.

According to preliminary estimates, losses to public and private properties are over ₹4,000 crores ($53,88,00,000). Losses due to flooding in Kolhapur and Sangli are ₹700 crores ($94,290,000).

Electricity infrastructure worth ₹1,200 crores ($ 16,16,40,000) has been damaged, while damage to roads and bridges is over ₹1,500 crores ($202,050,000). Crops across 338,000 hectares have been damaged in western Maharashtra and Konkan.



Hydrology of Kolhapur

The Flood devastation is increasing in this region due to rapid increase in population and human activities. In 2005, 107 villages were heavily affected by flood and 27 villages completely marooned by flood water.

During that period, 40,000 people were shifted to relief camps and 26 human casualties were reported. Agricultural area (520 sq. km) of Kolhapur district was also inundated as per state government report.

The stream flow data and rainfall analysis of Pancha-ganga river for the last fifteen years (2000–2015) show that the rate of discharge on 9 September 2011 with 68,109 cusecs was the highest at \ Rajaram river gauging station and on 26 July 2005, this region received the highest amount of rainfall within 24 h which was about 210 mm at Wadange station. The main impacts of floods are damage to property, infrastructure, and disruption to social and economic activities.

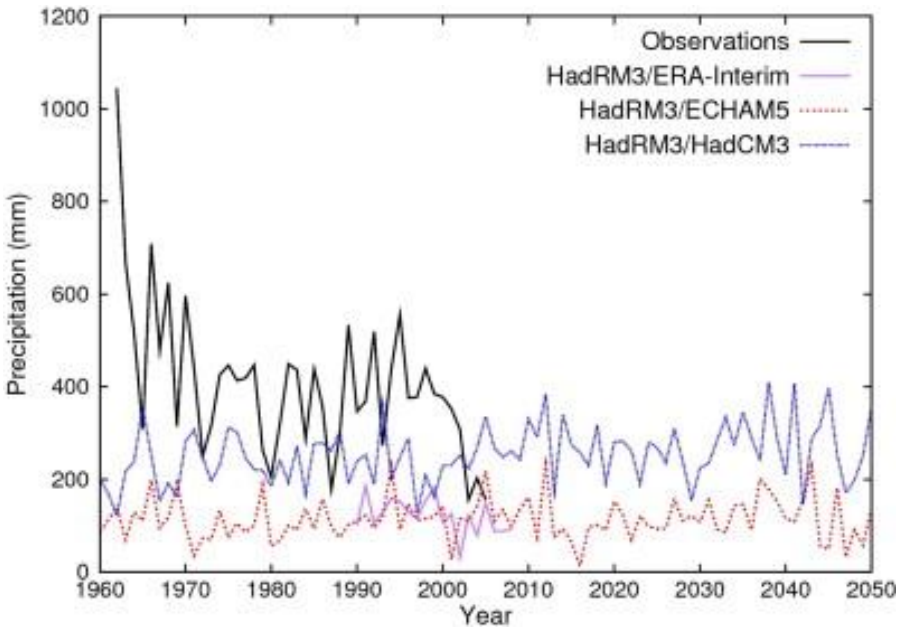
At present, 133 villages are prone to flood. The problems related to flooding have greatly increased in Pancha-ganga basin, and there is a need for effective modelling to understand the problem and to mitigate its disastrous effects.

Rainfall pattern

Rainfall data indicates that Konkan and adjoining Madhya Maharashtra experienced very heavy rainfall. In the beginning of the flood period i.e. from 27th Jul to 3rd Aug, the heavy rainfall events were localized in the northern part of the Konkan and adjoining North Madhya Maharashtra.

Many stations in Pune and Nasik districts, recorded rainfall more than 150 mm/day during the period 3rd to 5th Aug. Towards the latter part of the week, rainfall belt shifted towards south Madhya Maharashtra. Mahabaleshwar recorded highest rainfall of 380 mm on 5th Aug. 2019.

It is also observed that Kolhapur district continuously experienced heavy rainfall throughout the period with highest rainfall amounts on 6th Aug. 2019. Gaganbawda recorded its highest rainfall of 340 mm rainfall on 6th Aug.



It is also seen that though heavy rainfall occurred in the western part of the districts in Madhya Maharashtra, their eastern parts were devoid of rainfall. It is further seen that during the heavy rain spell of Aug. 2019, many stations in Kolhapur district and western part of Satara district have crossed their previous record of 7 days rainfall.

This indicates that compared to previous years, rainfall over the region was widespread and remained very intense for a long period during 27th July to 13th August 2019.

Sangli, Kolhapur and Satara district received very heavy rainfall of 1918 mm in comparison to 333 mm normal rainfall during 27th July to 13th August.

This was about 6 times the normal and at the same time, in the free catchment, downstream of the dams, it was about 18 times the normal. Such high range of continued rainfall in short duration resulted in extreme heavy flooding mainly in Sangli, Kolhapur town and few talukas situated near Krishna and Panchganga rivers.

It is observed that, the Flood affected districts of Satara, Sangli and Kolhapur continuously received excess to large excess rainfall during the first fortnight of August.

The flood disasters occurred during the monsoon of the year 2019, along river Krishna was primarily due to:

Persistent and simultaneous occurrence over large spatial areas, of heavy precipitation in short duration Climatological records of the Satara, Sangli and Kolhapur districts indicate that, there is a large variation in space of rainfall.

At present, 133 villages are prone to flood. The problems related to flooding have greatly increased in Pancha-ganga basin, and there is a need for effective modelling to understand the problem and to mitigate its disastrous effects.

While Mahabaleshwar at an elevation of 1372 meters gets an average annual rainfall of 5886.9 mm, other stations in this belt get annual rainfall ranging between 1684 and 2195 mm.

Compared to Kolhapur and Satara, district of Sangli has relatively lesser average annual rainfall of about 670mm. The persistent intense rainfall activity over the region was in association with an active spell of monsoon started over Maharashtra from 27th July 2019 and resulted in flooding in many parts of Konkan and North Madhya Maharashtra.

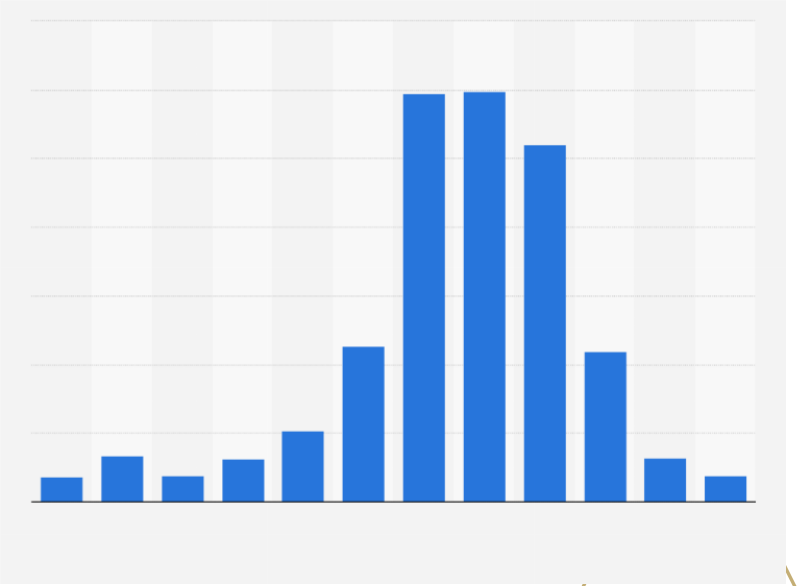
This was followed by another active monsoon spell from 3rd August 2019, in association with the formation of a low pressure over North East Bay of Bengal and its subsequent intensification into deep depression and westward movement in the subsequent days causing severe flood conditions in South Madhya Maharashtra.

This movement of deep depression system (an active low pressure system with wind speed ranging between 52 to 61 kmph) across central India, resulted in enhancement of rainfall over west coast and in the ghat areas of Madhya Maharashtra with heavy to very heavy rainfall and extremely heavy rainfall events for more than a week period over these places, resulting in severe flood situations. Maharashtra State has an average annual precipitation of about 741mm.The rainfall in the state is controlled by south west and north east monsoon.

About 90% of rainfall occurs during monsoon months from June to October every year. The high intensity storms prevailing during the monsoon months result in heavy discharges in all the rivers.

The continuous and heavy precipitation that occurs in the steep and undulating terrain, finds its way into the main rivers through innumerable streams and water courses. Flood event 2019 in Krishna basin is an example. Basin experienced an abnormally very high rainfall between 25th July to 13th August, resulting in severe flood in Sangli, Kolhapur, Satara districts. Average actual rainfall was about 6 times the normal rainfall in all dam catchments bringing abnormal flood to downstream areas.

The overall observed rainfall over the normal was about 18times. Such abnormal high occurrence of rainfall even in free catchments also aggravated floods in Sangli & Kolhapur districts. It can be seen that the contribution of free catchment, in the discharge observed in river Krishna, at Irwin Bridge at Sangli, was 49%. Similarly, the contribution of free catchment, in the discharge observed at Rajaram weir on river Panchganga, was 84%. The discharge from free catchment, which was substantial and had no control.



Typical Topographical features and river meandering By study of topographical features of the Krishna sub-basin including its tributaries in Maharashtra, it was found that the River Krishna originates at the highest altitude of 1310 m at Mahabaleshwar, and also the Koyna at the same place, they reach at Pritisangam, the confluence of Krishna and Koyna at Karad at the altitude of about 550 m. thereafter, there is sudden change in the river bed slopes in the Krishna river upto Sangli. While negotiating the Sangli city, the rivers Yerala and River Warna meets Krishna and thereafter within few kilometers there is confluence of River Panchganga leading Krishna to state border.

The Krishna river reach from Sangli city to state border is only 30-40 kms long, having very flatter bed slopes and many meanders. This, typical topographical set-up plays major role in slowing down the flood dissipation beyond Sangli city. It was found that, in this reach of river, while there is drastic reduction in the velocities of the flow, the backwater effects of various confluences of its own tributaries further aggravate the problem.

While the floods in main Krishna River are yet to dissipate this particular reach, the floods coming from tributaries by simultaneous raining cannot even enter in the main river course of Krishna. The situation was further aggravated as these tributaries could not drain out their own discharge, when river Krishna was already flooded, which was spread on the side banks of the tributaries.

This peculiar situation resulted in long term inundation alongside the flood plains of tributaries like Warna and Panchganga, while increasing the back water effect near confluences resulting in the higher flood levels at Sangli, Kurundwad and Kolhapur cities.

Water Allocation (KWDT)

Krishna water allocation by two tribunals (in thousand million cubic feet feet)		
Year	2013	1976
Andhra Pradesh	1,005	811
Karnataka	907	734
Maharashtra	666	585

***Karnataka government allowed to increase the height of Almatti to 524.256 meters from 519**
***Andhra Pradesh loses its freedom to enjoy surplus water**

Projects under threat

Seven projects planned on surplus waters (total 227.5 tmc)

<u>Telangana</u>

Nettampadu Lift Irrigation Scheme 22 tmc
Kalwakurthy LIS 25 tmc
AMRP (SLBC) 30 tmc

<u>Rayalaseema</u>

Teluguganga 29 tmc
Handri-Neeva 40 tmc
Galeru-Nagari 38 tmc

<u>Andhra</u>

Veligonda 43.50 tmc

The report of the Krishna Water Disputes Tribunal-II (2010)

KWDT-II freshly assessed the yearly yields in the Krishna and determined the award on the basis of the yearly yield at 65 per cent dependability which was assessed at a total of 2,293 tmcft.

In its order, announced in an open court, the tribunal allocated a total share of 1,001 tmcft to Andhra Pradesh, 911 tmcft to Karnataka and 666 tmcft to Maharashtra with certain restrictions imposed on each State in keeping with the dependable flows of the rivers on which the allocations have been made.

The allocation under the first award (KWDT I) was 811 tmcft for Andhra Pradesh, 734 tmcft for Karnataka and 585 tmcft for Maharashtra.

The tribunal permitted Karnataka to raise the storage level in the Almatti dam To 524.256 metres from 519.6 metres, a measure seen by Andhra Pradesh as depriving its lower Krishna delta region of water supply. The tribunal, however, directed Karnataka to make regulated releases of 8 to 10 thousand million cubic feet (tmcft) from the dam to Andhra Pradesh in June and July.

Some of the clauses in the final order of KWDT II are –

For the purposes of this case, the yearly yield of the river Krishna was prepared afresh, on the data now available - an yearly water series for 47 years and accordingly the dependable yield was determined as: Average yield - 2578 TMC; Yield at 50% dependability - 2626 TMC; Yield at 60% dependability - 2528 TMC; Yield at 65% dependability - 2293 TMC and Yield at 75% dependability - 2173 TMC.

It was decided that the water of river Krishna be distributed amongst the three States of Maharashtra, Karnataka and Andhra Pradesh on 65% dependability of the new series of 47 years i.e. 2293 TMC.

It was decided that the allocations already made by KWDT-1 at 75% dependability which was determined as 2060 TMC on the basis of old series of 78 years plus return flows, assessed as 70 TMC in all totalling to 2130 TMC, be maintained and shall not be disturbed.

How we can work with KWDT II are –

- KWDT was initiated in British period
- KWDT was developed without taking concern of flood
- Water maintainability in region was also taken without considering flood effects on it.
- 50% rain in Maharashtra Basin measured without considering the flood volume.
- **THE QUANTITY OF EVAPORATION LOSS TO BE ADJUSTED IN DISPOSAL OF THIS WATER TO SEA THROUGH THIS PROJECT.**

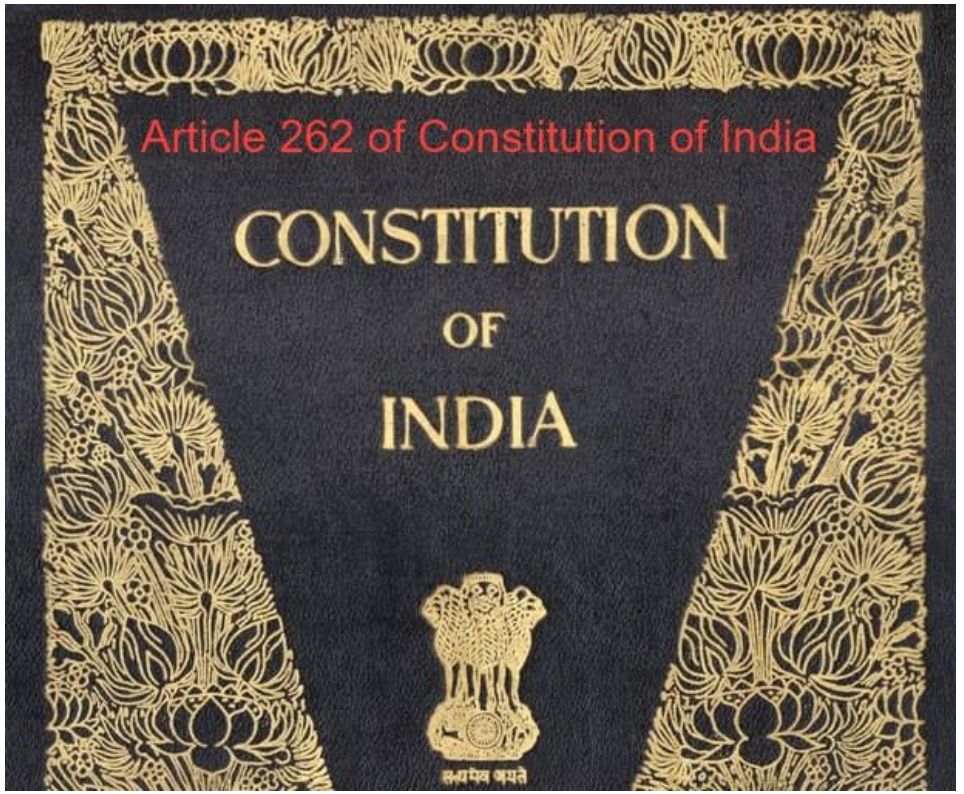
Separate Hydraulic model of flood need to finalize.

- **Relief in SALT EXPORT -**

- KWDT-2 has allocated entire average water (2578 TMC) yield in the river among states except 16 TMC which is to be let downstream of Prakasam Barrage near Vijayawada to the Sea as minimum environmental flows. There is no water allocation for the purpose of salt export to the sea. When rain water comes in contact with the soil, it picks up some salts in dissolved form from the soil. The total amount of dissolved salts contained in the river water has to reach sea without accumulating in the river basin. This process is called "salt export". So 850TMC is required for this.

Article 262

- The article 262 states that
- **Adjudication of disputes relating to waters of inter State rivers or river valleys**
- **(1) Parliament may by law provide for the adjudication of any dispute or complaint with respect to the use, distribution or control of the waters of, or in, any inter State river or river valley**
- **(2) Notwithstanding anything in this Constitution, Parliament may by law provide that neither the Supreme Court nor any other court shall exercise jurisdiction in respect of any such dispute or complaint as is referred to in clause (1) Coordination between States.**



Northern India Canal and Drainage Act, 1873 (Inundation canal act)

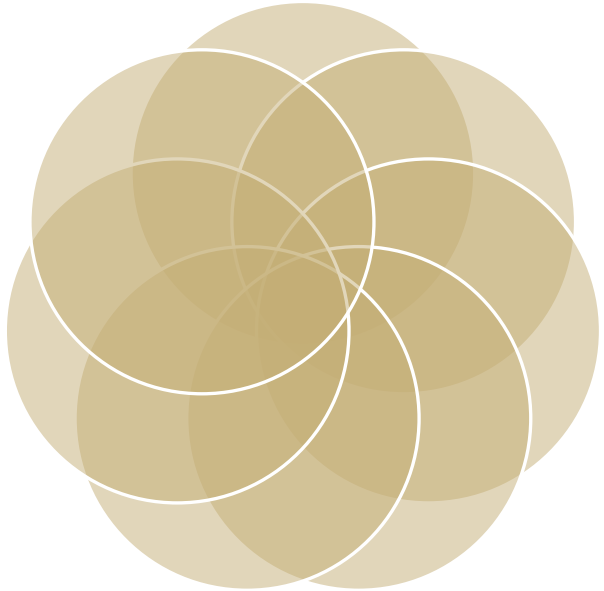
Act No. 8 of 1873

Canal - "Canal" includes -

(a) all canals, channels and reservoirs constructed, maintained or

(b) all works, embankments, structures, supply and escape channels connected with such canals, channels or reservoirs;

controlled by the State Government for the supply or storage of water;



An Act to regulate Irrigation, Navigation and Drainage in Northern India.

This act states that the territories to which this Act extends, the Provincial Government is entitled to use and control for public purposes the water of all rivers and streams flowing in natural channels, and of all lakes and other natural collections of still water; and whereas it is expedient to amend the law relating to irrigation, navigation and drainage in the said territories.

(d) any part of a river, stream, lake or natural collection of water or natural drainage channel, to which the State Government has applied

The provisions of Part II of this Act; (e) a field drain for the purposes of section 70 of this Act. **[(1A) Temporary water course**. – "Temporary watercourse" means a

watercourse which has been in existence for a continuous period of not less than six months prior to the date of its demolition, alteration, enlargement or obstruction, but which may not be a recognized watercourse as hereinafter defined.]

The Local implementation of the North India Inundation Canal Act is entertained as follows:

Local extent. - It extends to Uttar Pradesh and the territories which, immediately before the 1st November, 1956, were comprised in the States of Punjab and Delhi and **applies to all lands whether permanently settled, temporarily settled or free from revenue.**

Inundation canal

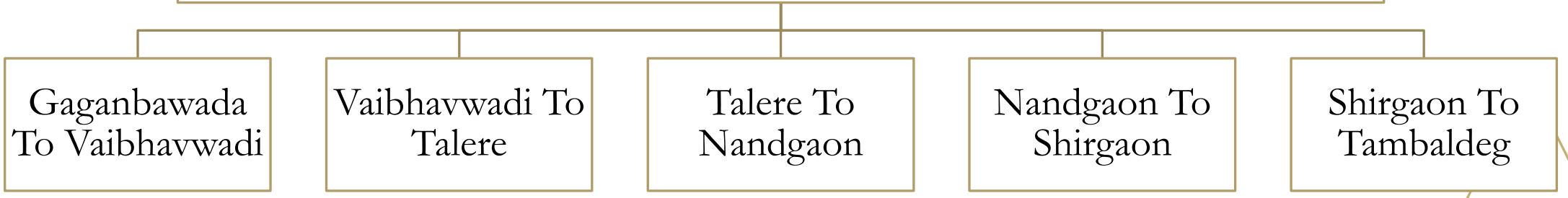
Inundation canals are traditional methods of flood water control and are commonly found in Madhya Pradesh, Andhra Pradesh, Haryana,

Punjab and Bihar state of India.

- The inundation channel are those that are meant to carry the overflow of water for the rivers and the water bodies to the field for irrigation purposes.
- They have been traditionally meant for water harvesting in India. They help in the control of floodwaters firm spreading and act as water transportation measures.
- This ancient system of the overflow of water lasted for thousands of years, the channels were broad and shallow and the canals were long and continuous and irrigation was performed by the cuts in banks of channels with were closed when the floods were over.

Field Analysis

The potential way to construct the flood line system (pipeline system)in order to control the flood situations there are several aspects in order to map the pipelines , However taking into consideration of ending the pipelines in to Arabian sea here are the cities\villages through which the systems can be installed



“If you can film an idea in your mind, follow that film idea shot for shot, scene for scene, that idea is worth making.

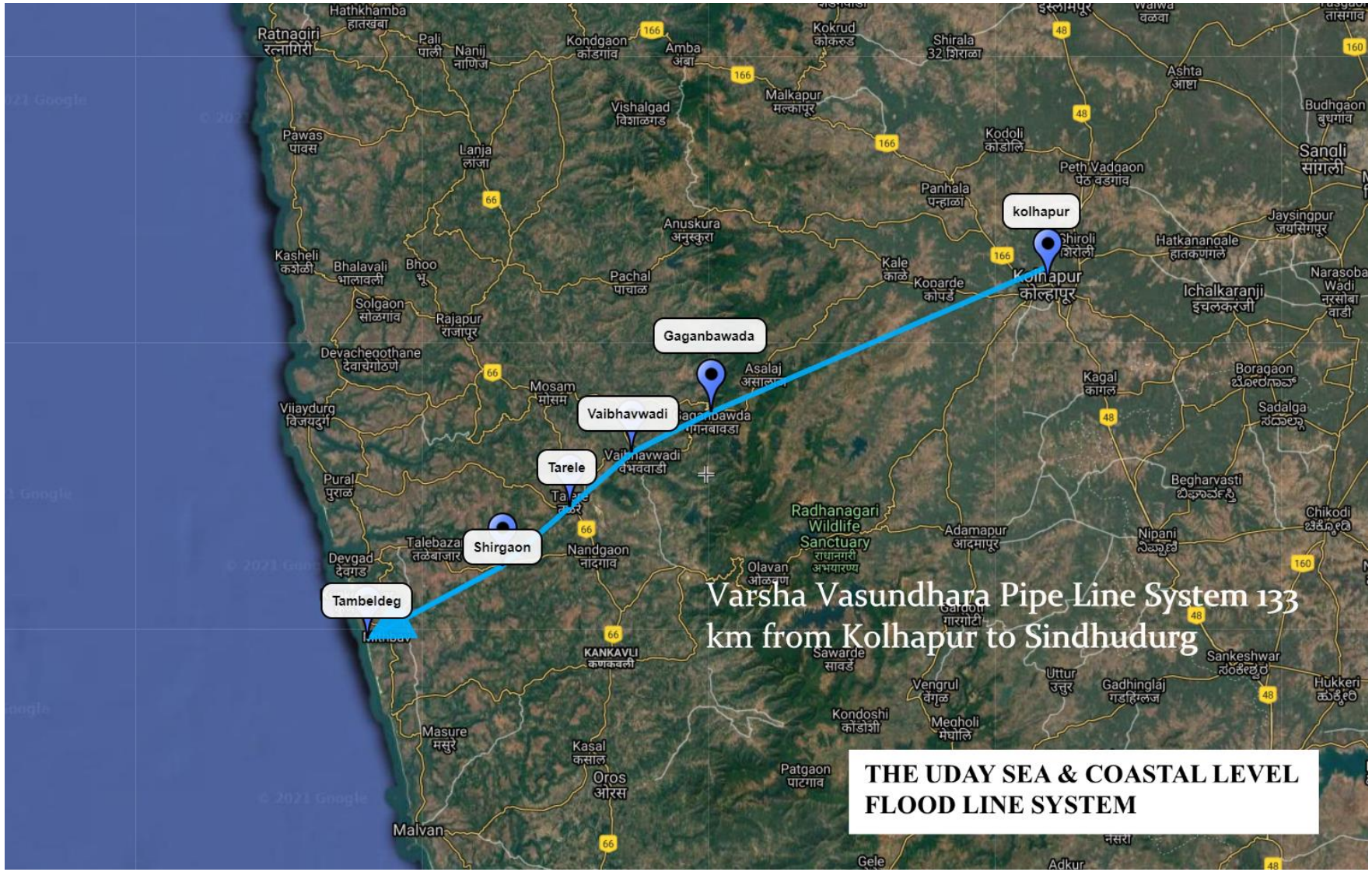
- CRAIG MAPP

INDIAN PENINSULA

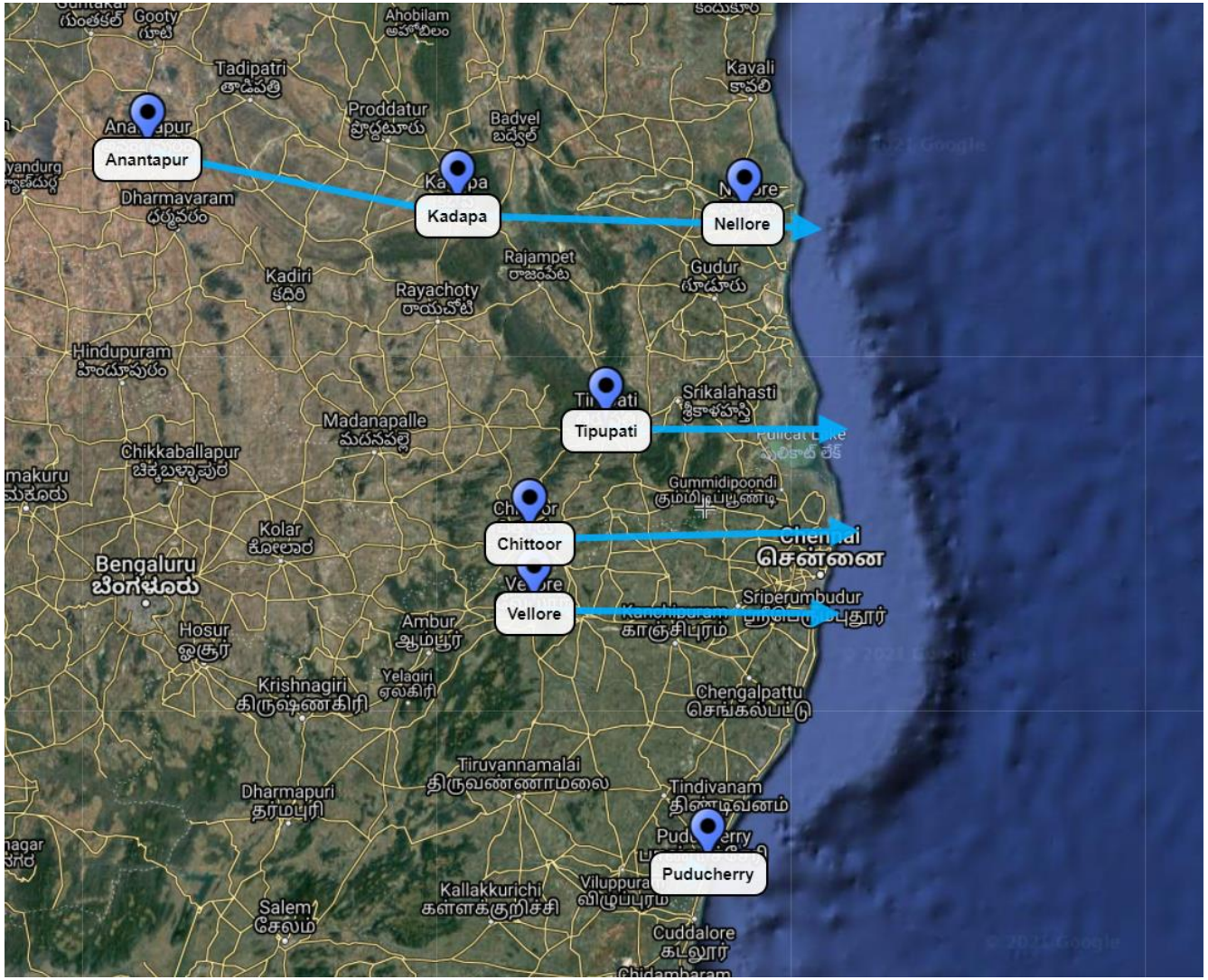
SPECIFIC SITES AND SPECIFIC DEVELOPMENT

We are focusing on establishing Uday Sea and Costal Level Flood Line Systems on some of the most dangerous sites of villages and cities where Loss is tremendous in short period of time.

Pilot Project – Kolhapur



UDAY FLOOD LINE SYSTEM – shows how VARSHA VASUNDHARA line can be established




THE UDAY SEA AND COASTAL LEVEL FLOOD LINE SYSTEM ©
India
Kanpur
Patna
BIHAR
Prayagraj
Varanasi
Gaya
JHARKHAND
Ranchi
WEST BENGAL
Kolkata
Jamshedpur
Indore
MADHYA PRADESH
Ahmedabad
CHHATTISGARH
Raipur
Nagpur
Amravati
Bhilai
Surat
ODISHA
Nashik
Aurangabad
Mumbai
MAHARASHTRA
Brahmapur
Nanded
Pune
Solapur
TELANGANA
Visakhapatnam
Kolhapur
Gulbarga
Vijayawada
Kakinada
Belagavi
Hubli
GOA
KARNATAKA
ANDHRA PRADESH
Bengaluru
Mangalore
Mysuru
Bay of Bengal
PUDUCHERRY
TAMIL NADU
Kozhikode
Tiruchirappalli
Madurai
LAKSHADWEEP
KERALA
Create Legend
Google
Approx: Andhra Pradesh, India
Data View
VARSHA VASUNDHARA PIPELINE SYSTEM

Uday flood line system piolet project trial

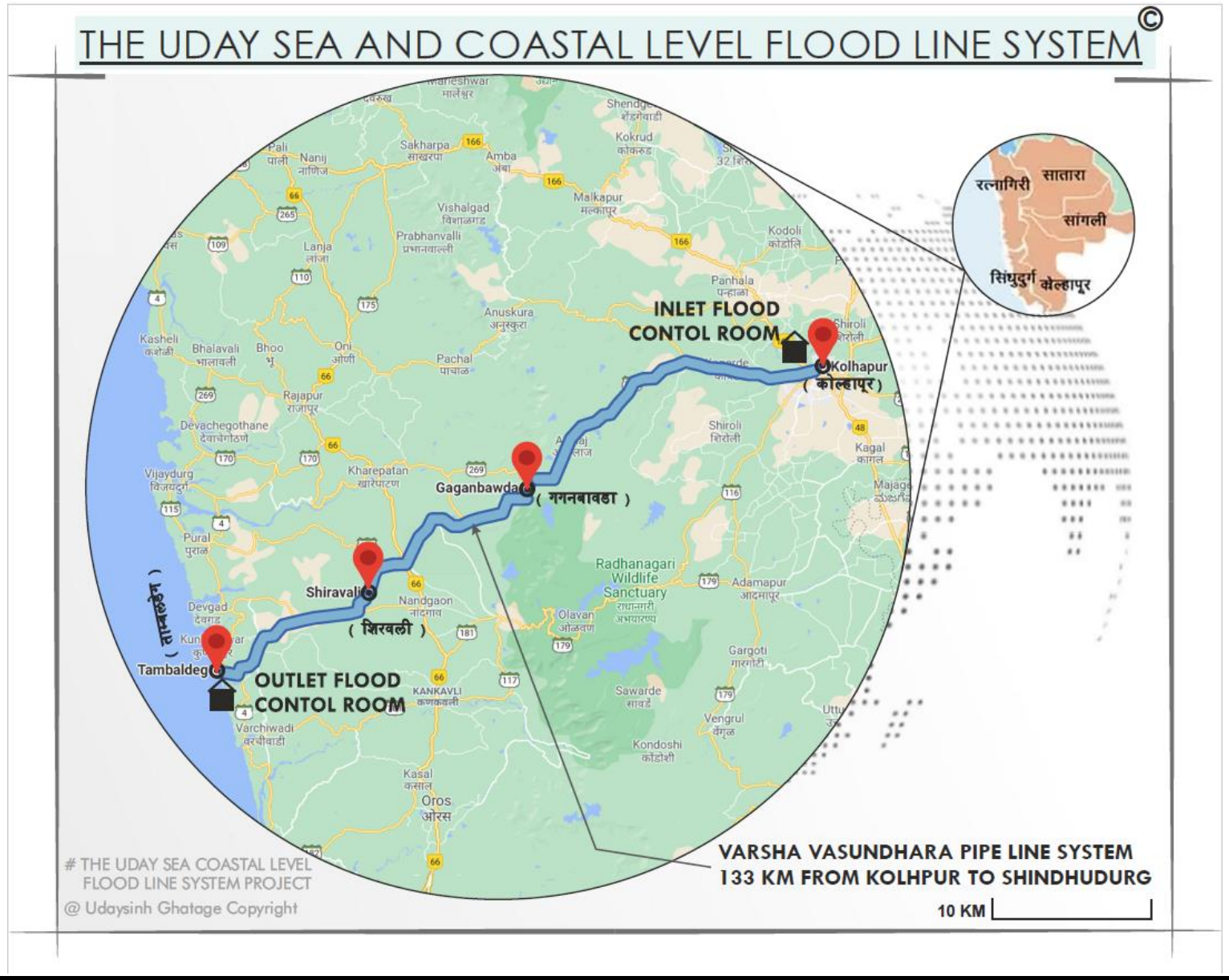
Flood hazard causes great loss to lives and properties leading to disturbance in human society. Flood is the single most hydro meteorological hazard causing substantial losses.

The project states the topic of flood crisis management and the project's benefit. The Uday flood line system piolet project trial is a project that shall help lakhs of people. The flood situation that affects the area of Kolhapur, Sangli and other districts creates a huge loss for the people. This particular flood occurs due to the Arabian sea, which brings the bulk of the rains, due to rise in surface temperature over the years, pointing to global warming. Therefore, the project plays a vital role in the upcoming crisis and shall benefit a lot to the people living under this particular area.

Taking the article 262 into consideration, the piolet project trial is a perfect solution under North India Inundation Canal Act and does not have the water access that is related to the Krishna basin river, our project is purely based on the access of excess water that is generated due to natural cause i.e. floods and this shall be our prime focus to release of specific TMC water for the specific time and eliminating it to the west. And the project ultimately helps a lot of people living in the area of Kolhapur and sangli.

Our project deliberately focusses as per the North India Inundation Canal Act which is purely into the public interest, public welfare and wellbeing. Therefore, our project intensions stand clean and clear.

THE UDAY SEA AND COASTAL LEVEL FLOOD LINE SYSTEM©



Several phases that shall be inculcated for the trial project

Phase 1 – In the phase one of the piolet project trial we shall plan to release the water directly to the sea for the first four floods, we will have the clear intentions to do release the water directly to the sea and once we get successful we will understand the terms to manage the excess water later in phase 2 then we shall plan for the same.

Phase 2 – In the later phase 2 we will get to know the flow of water through the pipe line and after the successful flow of the water for the first four floods we will understand how much water should be allowed for water resource utilization and we can work towards the beneficial means of the water, we can even look for the optimal productivity of the water that shall be allowed from the uday flood line system.

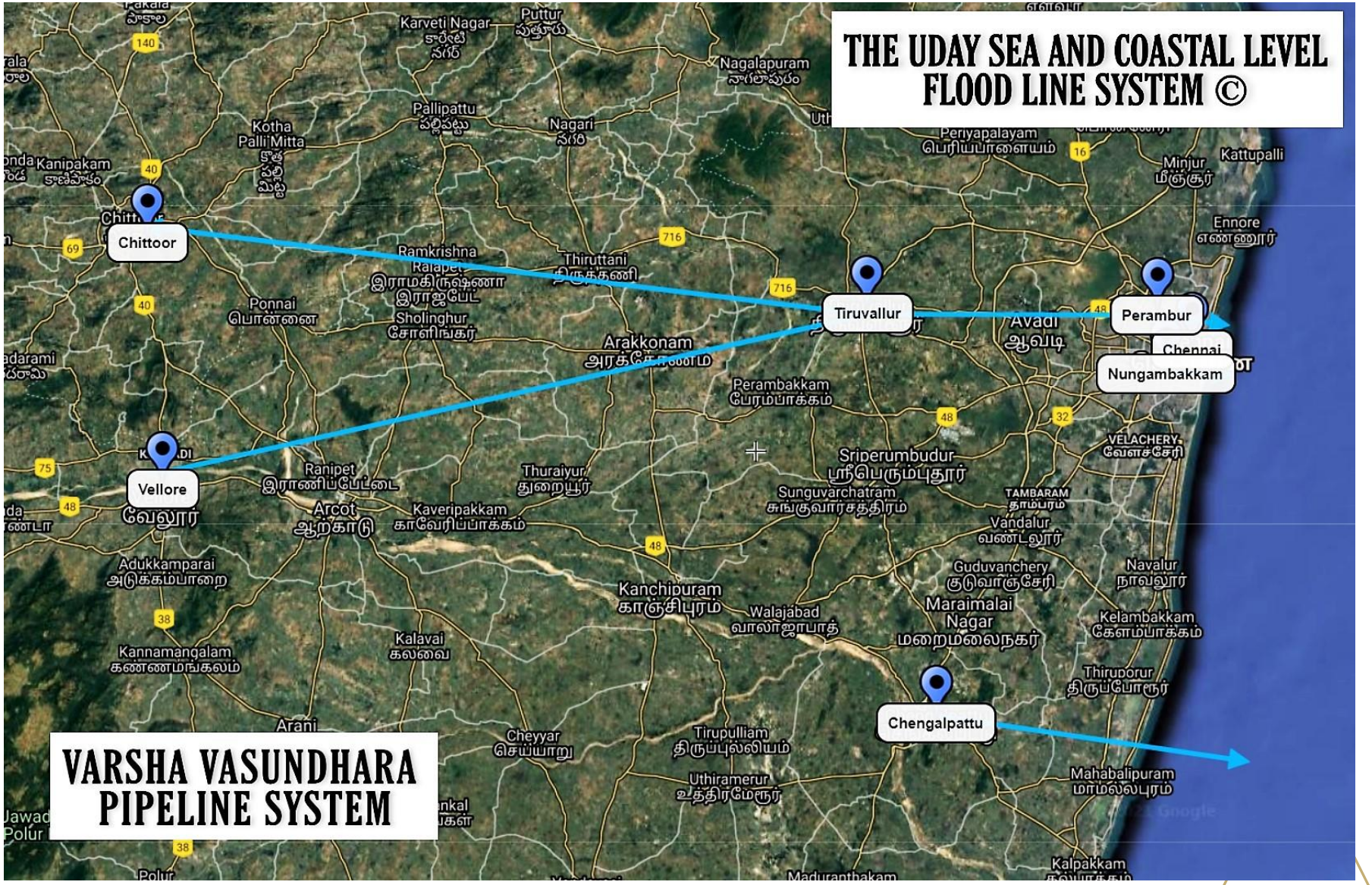
As India is a peninsular plateau and there are several such places like Kolhapur sangli which are getting affected by the floods and due to heavy rain falls. Therefore, this particular project shall play a leading vital role in the upcoming years that shall help a lot in saving lives and the state's economy and the livelihood of the people.

Floods affected Areas and Assumed possible way out.

Kerala & Madurai

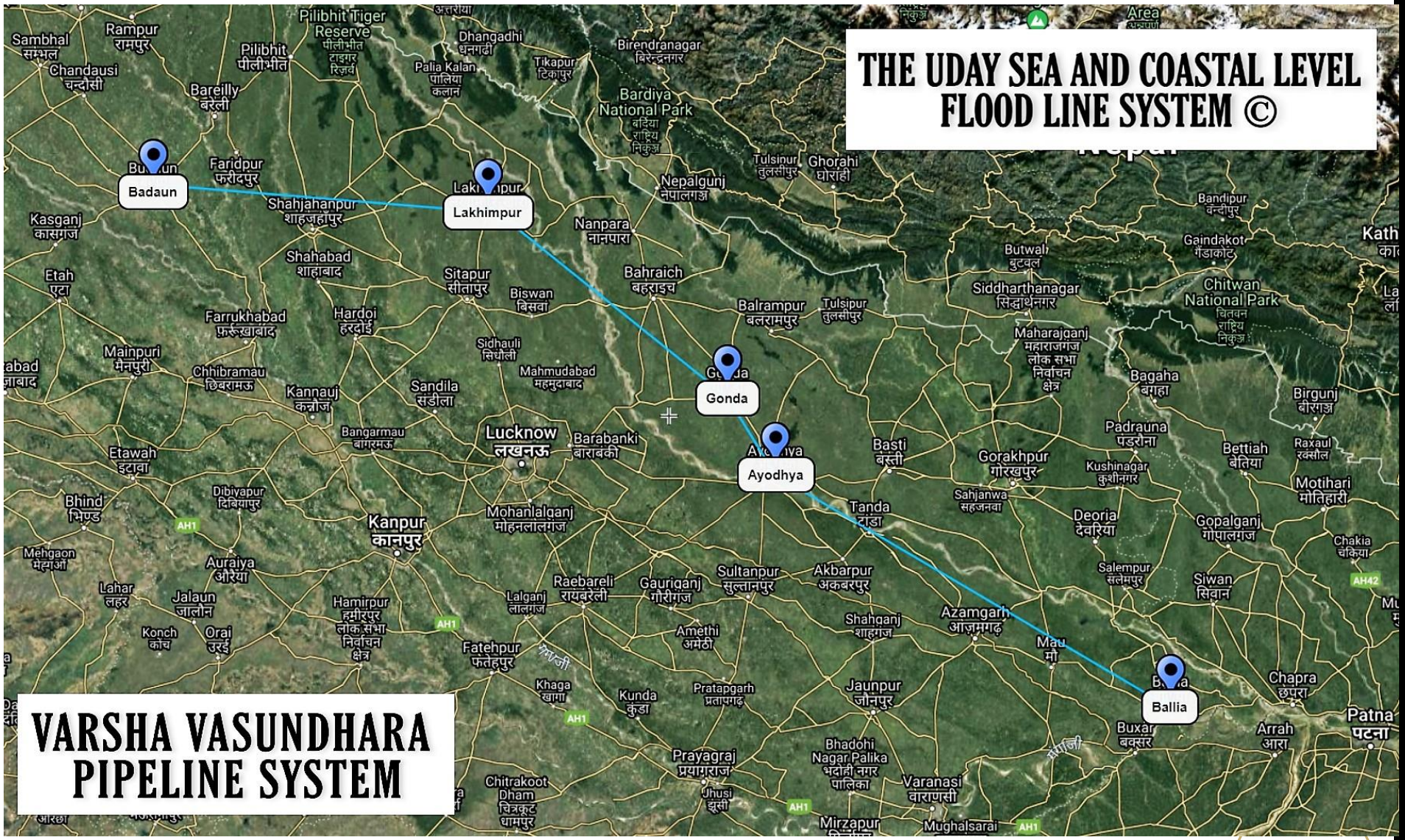
North India
(UP, Odisha &
West Bengal)

Tamil Nadu


THE UDAY SEA AND COASTAL LEVEL FLOOD LINE SYSTEM ©
Chittoor
Tiruvallur
Perambur
Nungambakkam
Vellore
Chengalpattu
VARSHA VASUNDHARA PIPELINE SYSTEM

Andra Pradesh & puducherry

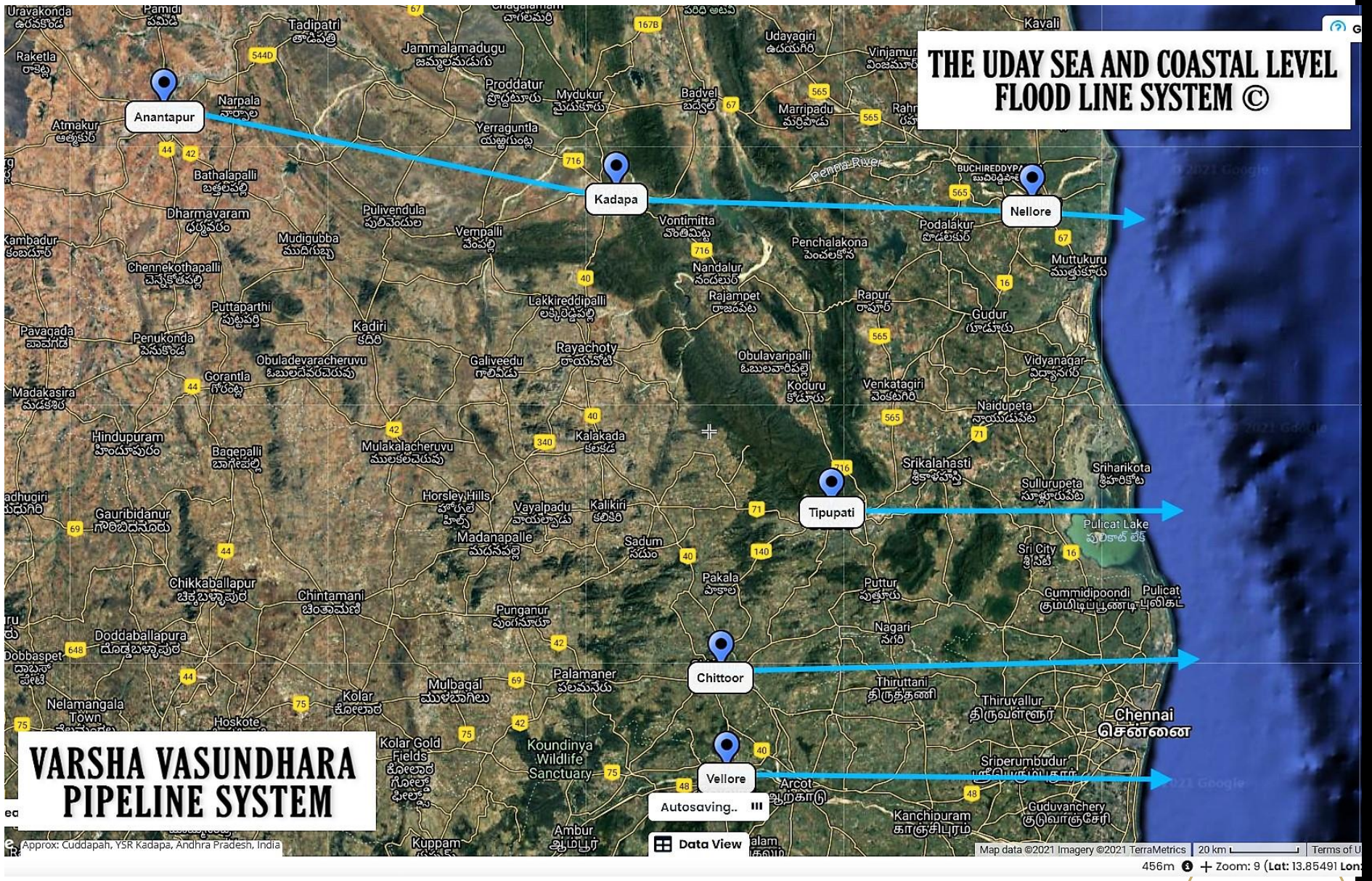
Uttar Pradesh



West Bengal

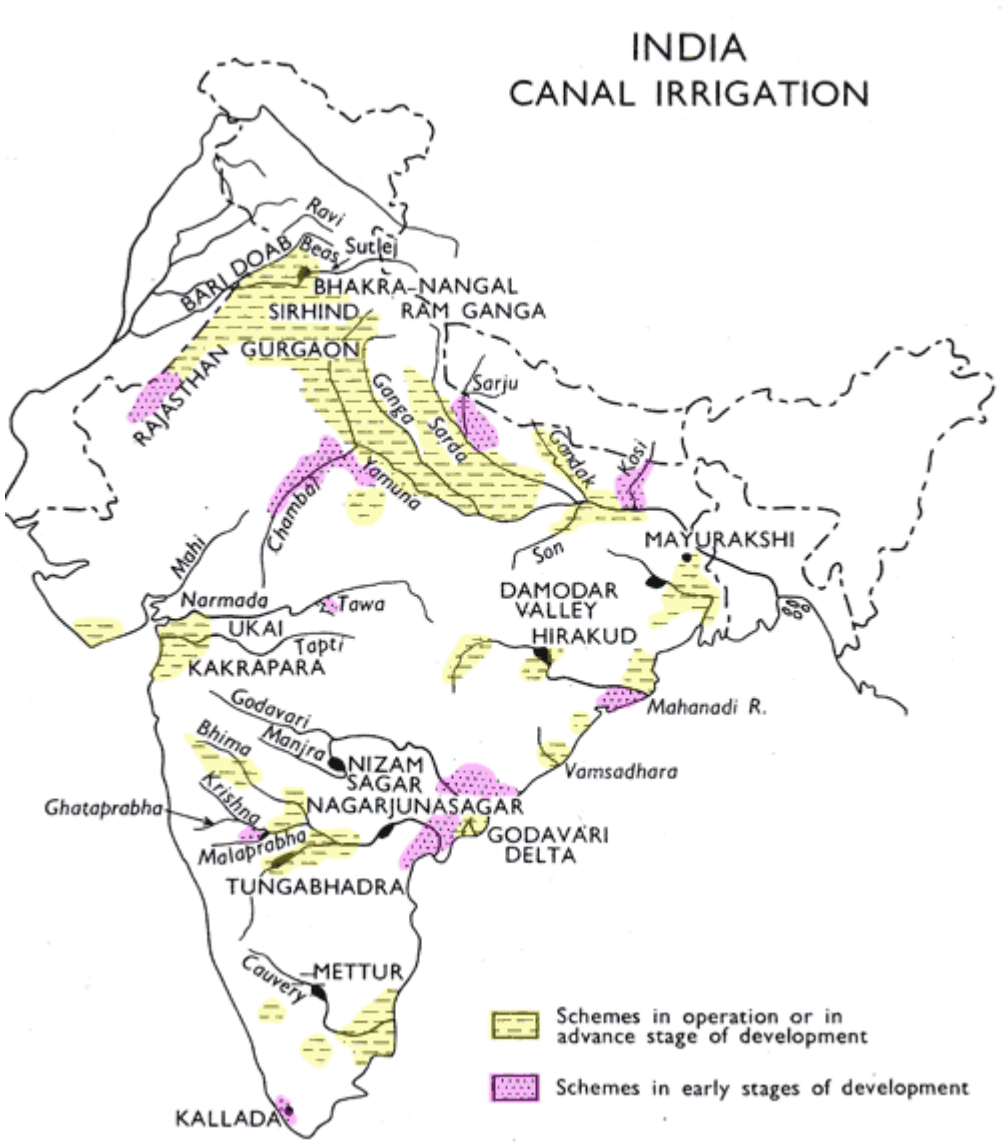

THE UDAY SEA AND COASTAL LEVEL FLOOD LINE SYSTEM ©
Birbhum
Paschim Bardhaman
Purulia
Bankura
Purba Baddhaman
Hooghly
Howrah
Jhargram
Purba Medinipur
Mayurbhanj
Balasore
Bhadrak
VARSHA VASUNDHARA PIPELINE SYSTEM

Andra Pradesh



Peninsular Plateau

Peninsular Plateau


INDIA
CANAL IRRIGATION
Ravi
Beas
Sutlej
BARI DOAB
BHAKRA-NANGAL
SIRHIND
RAM GANGA
GURGAON
RAJASTHAN
Ganga
Sarda
Sarju
Gandak
Kosi
Yamuna
Chambal
Mahi
Son
MAYURAKSHI
DAMODAR VALLEY
Narmada
Tawa
UKAI
HIRAKUD
Tapti
KAKRAPARA
Mahanadi R.
Godavari
Manjra
Bhima
NIZAM SAGAR
Vamsadhara
Krishna
Ghataprabha
NAGARJUNASAGAR
Malaprabha
GODAVARI DELTA
TUNGABHADRA
METTUR
Cauvery
KALLADA
Schemes in operation or in advance stage of development
Schemes in early stages of development

Few Inundation canals of India

- **The Sirhind Canal**

  The Sirhind Canal is a large irrigation canal that carries water from the Sutlej River in Punjab state, India. It is one of the oldest and biggest irrigation works in the Indus river system, and was inaugurated in 1882 CE. The canal begins at Ropar headworks near Ropar city in Rupnagar district of Punjab.

- **Indira Gandhi Canal**

  This is the longest canal in India. It was originally known as Rajasthan canal.

  Indira Gandhi canal starts from the Harike Barrage at Harike, which is few kilometers away from confluence of two rivers – Beas and Satluj.

  This canal ends at Thar desert in Rajasthan.

  This canal consists of Rajasthan main canal which is 445 kilometers, and this main canal has feeder canals in Punjab, Haryana and Rajasthan.

  Indira Gandhi canal covers 7 districts of Rajasthan namely: Sriganganagar, Jodhpur, Jaisalmer, Barmer, Bikaner, Hanumangarh, Churu.

  This canal has helped in cultivating different types of crops in semi-arid regions.

- **Kurnool Cuddappah Canal**

  It is popularly known as KC Canal. This canal is located in the Cuddappah and Kurnool districts of Andhra Pradesh.

  It was constructed between 1860 and 1873 for navigation and irrigation purpose.

  The starting point of this canal is located near Kurnool, on Tungabhadra river.

- **Buckingham Canal**

  This canal is 796 kilometers long. It runs parallel to the Coromandel Coast of India.

  It connects Villuppuram District in Tamil Nadu and Kakinada City located in East Godavari district of Andhra Pradesh.

- **Sutlej Yamuna link canal**

  This is an under construction canal.

  It will be 214 km long. This canal will link Yamuna and Sutlej rivers.

  This canal once completed will meet the needs of people in the states of Haryana and Punjab.

There are several such canals constructed in North India in order to control the floods and the River water level during Rainy season. And as a solution to heal the Kolhapur and sangli in the upcoming situation the Piolet Project trial is the right fit and much needed in the current scenario.

Technical details


Thank
You