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The Blue Revolution

CONNECTING
INDIA'S
RIVERS



EXCLUSIVE INTERVIEW | **NITIN GADKARI**

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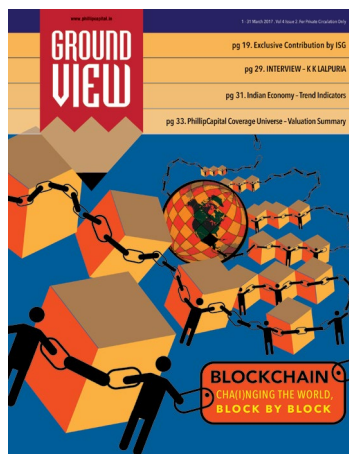
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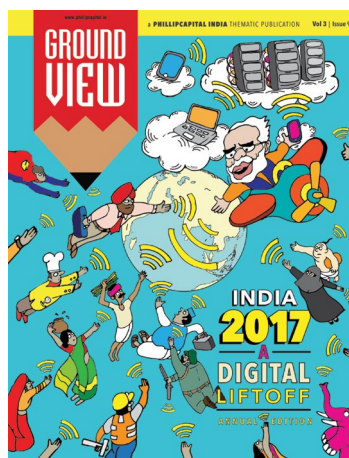
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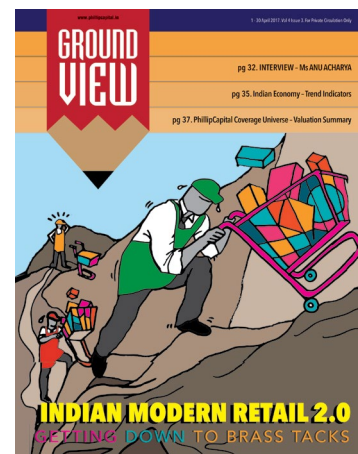
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Letter from the MD

Rivers have always been an important part of the Indian ecosystem. For centuries, towns and cities have sprung up on the banks of rivers, as the rivers provided for the primary source of livelihood – agriculture. However, with erratic rainfall, the same rivers also create havoc – including prolonged spells of droughts, and recurring floods. Many dams and canals have been built in India to channelize the flow of the rivers, but these have not proved enough.

The Blue Revolution, which we deep-dive into, is the cover story of this edition of Ground View, promises to take care of problems such as droughts and floods. The National River Linking Project (NRLP) envisages connecting primary rivers in India to mitigate recurring droughts and floods, apart from providing significant irrigated land and hydropower. It is also likely to provide a huge boost to the construction, cement, and steel industries, apart from creating thousands of temporary and permanent jobs – an added advantage. Our analyst, Vibhor Singhal, has done extensive on-the-ground research and met various government officials to tell us the inside story of this mega project.

Also in this issue are excerpts from an exclusive interactive session with the Minister for Road Transport & Highways, Shipping and Water Resources, River Development & Ganga Rejuvenation – Shri Nitin Gadkari – that we hosted for our investors. The interaction provided a special perspective on the mammoth changes taking place in India's infrastructure, and some light moments too.

With these mega projects on the anvil, and a visionary at the helm, the state of infrastructure in India have never looked more promising!

Best wishes

Vineet Bhatnagar

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BY VIBHOR SINGHAL

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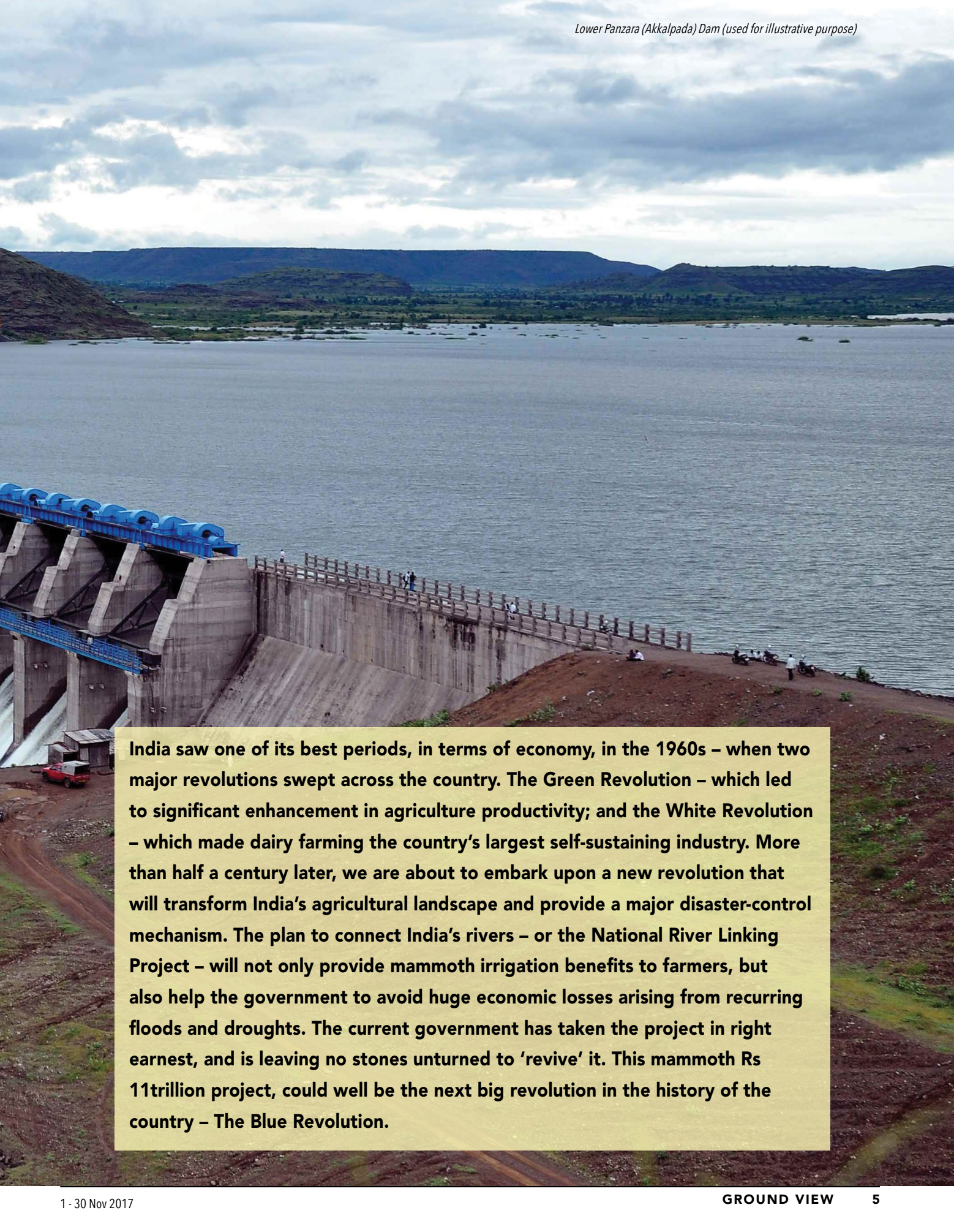
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India saw one of its best periods, in terms of economy, in the 1960s – when two major revolutions swept across the country. The Green Revolution – which led to significant enhancement in agriculture productivity; and the White Revolution – which made dairy farming the country's largest self-sustaining industry. More than half a century later, we are about to embark upon a new revolution that will transform India's agricultural landscape and provide a major disaster-control mechanism. The plan to connect India's rivers – or the National River Linking Project – will not only provide mammoth irrigation benefits to farmers, but also help the government to avoid huge economic losses arising from recurring floods and droughts. The current government has taken the project in right earnest, and is leaving no stones unturned to 'revive' it. This mammoth Rs 11trillion project, could well be the next big revolution in the history of the country – The Blue Revolution.

India - A Unique Topography

The inter-linking of the river project (or the National River Linking Project, NRLP, as it is called) is perhaps the most-hyped infrastructure project in India so far, and always surrounded by controversies. It has also made little or no progress since its inception three decades ago. The history of the 'concept' dates back to the 19th century, when Sir Arthur Cotton, working as an engineer with the Madras Presidency under the British rule, proposed interlinking rivers to promote inland navigation and water transport – but his plans were rejected in favour of railways. After that, as has been the case with any mega project in this country, multiple committees were formed to 'study' the project, its benefits, and its impact. Eventually, in August 1980, the Ministry of Irrigation prepared a National Perspective Plan (NPP) for Water Resource Development. As it stands today, the 1980 NPP provides the basic framework for the Interlinking of Rivers project – with few modifications/enhancements made since it was proposed.

India – a unique topography

India is endowed with enormous water-reservoir potential. The average annual water flow in the country is estimated to be 1,869 bn-m³ (BCM). But, there are wide variations in availability of fresh water over the geographical space and time period in the country. Although India holds 2.4% of the world's land area and 4% renewable water resources,

its share of the world population stands at a much higher 17.5%. Also, the rainfall pattern in India is highly skewed, with most of the rain occurring in the southwest monsoon months, while the rest of the year remains relatively dry. Prolonged dry spells exacerbate this uncertainty in rainfall. As a result, parts of Haryana, Maharashtra, AP, Rajasthan, Gujarat, MP, Karnataka, and TN tend to face rainfall deficits, resulting in droughts.

In contrast, excess rainfall results in regular floods in the Brahmaputra and Ganga river basins, which affect Assam, Bihar, West Bengal, and Uttar Pradesh. According to an estimate by the WHO, economic losses due to floods and droughts in 1990-2001 in India were at US\$ 4.6bn. With an increasing population base, the per-capita availability of water in India is rapidly declining. From 5.2k-m³ in 1950, it came down to 1.82k-m³ in 2001 and declined to 1.55k-m³ in 2011. It is expected to drop to as low as 1.34k-m³ in 2025!

Agriculture still remains the primary source of livelihood in this country. It contributes 15% of GDP and employs over 40% of the workforce. However, irrigation in India is still highly dependent on rains – even after 70 years of independence and scores of dams/canals that have been built. The current net cultivated area in India is 173mn ha. – foodgrains comprising a mammoth 121mn ha. However, only 66mn ha. of that area, is irrigate by canals, tube wells, wells and other means. A humongous 107mn ha. (almost 2/3rd) of the net cultivated area, is still dependent on the erratic monsoons. Little wonder then, that the monsoon is called India's true finance minister'.

For such a unique topography, with an erratic source of irrigation – the need for a large institutional mechanism, which maintains parity in water distribution, cannot be over emphasized. The linking of rivers project is something that India needed in the previous decade – the question is, will it be executed at least over the next decade?

India - Monsoon still its true FM

	mm ha		mm ha
Geographical Area	329	Net Irrigated Area	66
Net Cultivated Area	173	Canals	16
Foodgrains	121	TubeWells	30
Non Foodgains	52	Others	20
Area cultivated under rainfed conditions			107

Source: MOSPI

History of the project

In the 19th century, Sir Arthur Cotton, a royal engineer working with Madras Presidency, proposed a plan to interlink major Indian rivers to promote inland navigation and transport. However, the plan was shelved in favour of railways.

In 1972, Dr K.L. Rao, an engineer and former irrigation minister, proposed a “National Water Grid”. His plan envisaged a Ganga-Cauvery link that would divert surplus water (from Brahmaputra and Ganga basins) to deficit areas (central and south India). By that time, several inter-basin transfer projects had already been successfully implemented in India. However, even Rao’s plan too did not see the light of day as it was perceived to ‘lack’ any flood-control benefits.

In 1977, an Indian Airlines Pilot, Captain Dinshaw Dastur, proposed constructing two canal systems – the Himalayan Canal (at the foot of Himalayan slopes, running from the Ravi to the Brahmaputra), and the Garland Canal (in the central and southern parts of the country).

In 1980, the Ministry of Water Resources came out with a report “National Perspectives Plan (NPP) for Water Resources Development” – which drew its design from Captain Dastur’s proposal. The report split the water development project into two parts – the Himalayan and Peninsular components.

In 1982, a committee of nominated experts was setup, through National Water Development Agency (NWDA) to complete detailed studies, surveys, and investigations about reservoirs, canals, and all aspects of the feasibility of inter-linking peninsular rivers and related water-resource management. Over the next 35 years, from 1982 to 2017, NWDA conducted multiple studies and produced many reports.

Most central governments have caved in to opposition from various camps – from ecological and environmental issues, to rehabilitation of people, and lack of national/international consensus. In 1999, the NDA government, under the leadership of the then PM, Atal Bihari Vajpayee, tried to revive the project – it formed a national-level committee to build consensus among various states. However, over the subsequent decade, under the UPA rule, the project was put on the back burner.

In 1977, an Indian Airlines Pilot, Captain Dinshaw Dastur, proposed constructing two canal systems – the Himalayan Canal and the Garland Canal - which form the underlying design for the current NRLP

In 2014, as the NDA came back to power, it revived the project and started building consensus. Over the last two years, multiple clearances have come through and many obstacles have been surmounted for some of the project’s key components. The latest fillip came from the recent cabinet reshuffle in which the Surface Transport minister, Mr Nitin Gadkari, took over the Ministry of Water Resources. Mr Gadkari is not only seen to be aggressive in terms of execution, he has an established penchant for mega projects. Soon after taking charge, he set the ball in motion for the interlinking project and is looking to start work as early as December 2017.

FLOODS and DROUGHTS in India

India has a unique problem – it is hit by droughts and floods within the same year, year after year. With rainfall patterns highly skewed, and a non-existent water transfer mechanism – from water surplus to water deficit regions, the problem has only aggravated over the last few decades despite huge investments in dams and canals across the country.

The problems associated with floods are particularly alarming. A United Nations report on 'global assessment of disaster risk' estimates that India's annual average economic losses due

to floods are US\$ 7.5bn, and total economic losses due to all forms of disasters are US\$ 10bn. This is a huge cost for a nation in which 24% of the population still lives below the poverty line (officially). In a similar analysis, the Central Water Commission (CWC) estimated that economic losses due to floods in India were 0.11% of the GDP in 2011-16 – though these were lower than 0.86% of GDP over 1970-1990. At 0.11% of GDP, the losses amount to US\$ 2.5bn, 1,500 human lives, and 48,000 cattle.

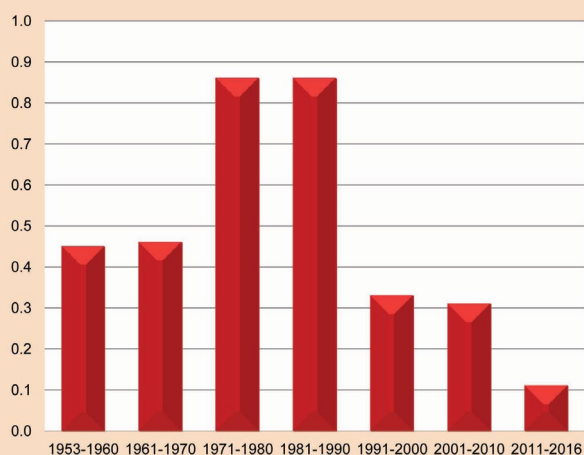
On the other hand, recurring droughts in water-deficit regions (Gujarat, Rajasthan, Maharashtra, and Karnataka) have led to huge economic losses and human lives. An ASSOCHAM study estimates that two years of successive droughts in 2014 and 2015 led to economic losses of US\$ 10bn in 10 states in India. Moreover, 'the impact of drought is likely to remain for at least six months, after the drought, because one needs resources and time to revive the activities on ground even if monsoon is predicted to be normal the next year', the report said.

India's average annual loss, by disasters

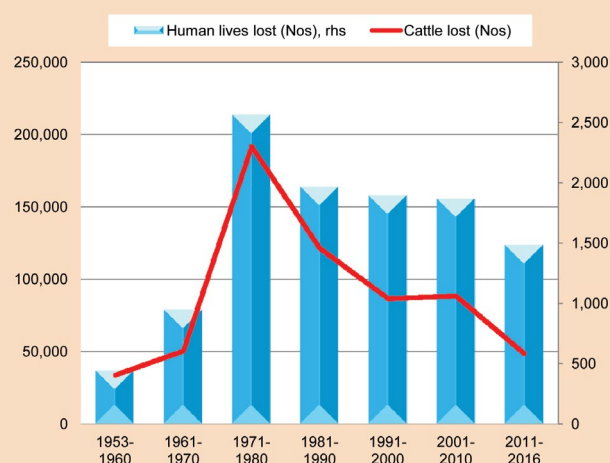
Annual Loss	\$ mn
Earthquakes	19
Cyclones	447
Storm surge	727
Tsunami	1,160
Flood	7,472
Total	9,825

Source: Global Assessment Report 2015 of UN office for Disaster Risk Reduction

Economic impact of floods (% of GDP)

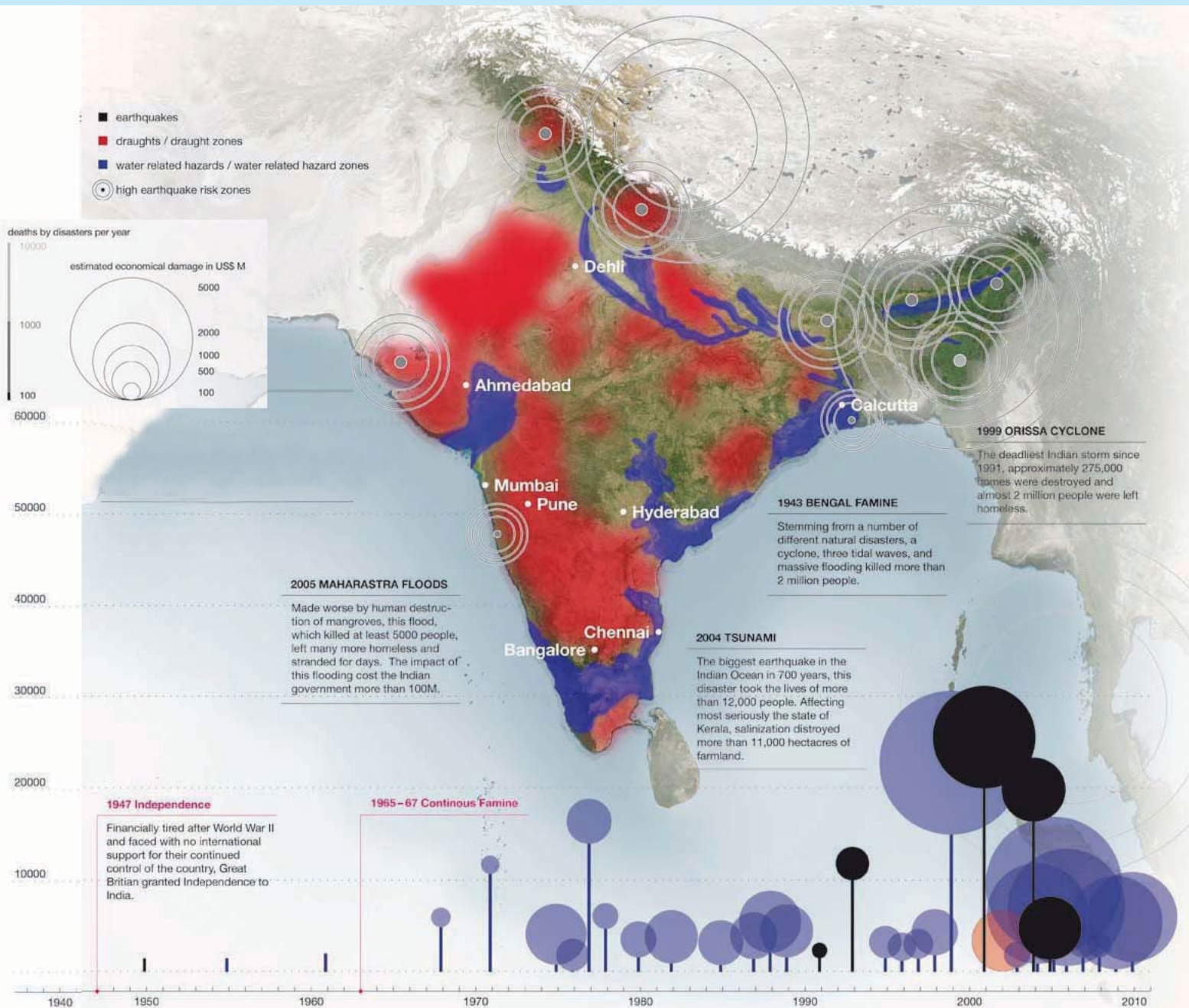


Economic impact of floods



Source: CWC

The Indian government has spend over US\$ 30bn over the last 30 years on disaster recovery (as per the CeEDMM, IITR). While few of the events were unprecedented (and unavoidable) – like the 1999 Odisha cyclone and the 2004 Tsunami – a large part of this mammoth economic loss is attributable to recurring (and avoidable) floods and droughts in the country.



The Centre of Excellence in Disaster Mitigation and Management (CoEDMM) is the first center of Disaster Mitigation and Management in India. It was established in 2006 with the aim of conducting the educational program, cutting edge research and training on disasters, vulnerability and their mitigation. Creation of a National Database for rapid dissemination of information and knowledge is also an objective. The centre has faculty with domain expertise in earthquake, landslide, cyclones, floods, tsunami cyber crime, avalanche, fire, industrial disaster, CBRN (chemical, biological, radiological and nuclear) and geomatic technology. Various research and consultancy projects are being carried out through sponsored funding from Govt. of India and other national and international funding agencies.

The National River-Linking Project (NRLP)

The Indian peninsula is blessed with as many as 111 rivers – the primary ones are Indus, Brahmaputra, Ganga and Yamuna (in the Himalayan region) and Narmada, Tapi, Godavari, Krishna, Mahanadi and Cauvery (in the Peninsular region). The CWC has divided the entire country into 22 river basins – the largest of them is the Ganga river basin, with a catchment area of over 860,000 sq.km.

The National River Linking Project (NRLP) , in its current state, envisions connecting 37 rivers through 30 links comprising of a network of over 50 dams and more than 15,000km of canals – to form a gigantic South Asian Water grid. The canals, are planned to be 50-100m wide and more than 6m deep. The project is expected to cost Rs 5.6trillion (in 2002 prices) – or approximately Rs 11.5trillion (in 2015 prices). The NRLP comprises of two components:

- **Himalayan rivers development:** This envisages construction of storages on the principal tributaries of the Ganga and the Brahmaputra in India, Nepal, and Bhutan. It also proposes inter-linking canal systems to transfer the surplus flow of the eastern tributaries of the Ganga to west India, and linking the three major rivers (Brahmaputra, Ganga, and Mahanadi) and their tributaries.
- **Peninsular rivers development:** This envisages construction of an inter-linking canal system, backed up by adequate storage, to meet the water requirements on the west side of India and to drought-affected areas in eastern India. It proposes to link the rivers Mahanadi-Krishna-Pennar-Cauvery, Ken-Chambal, and the west-flowing rivers in Maharashtra.

River basins in India

Basin Name	Basin area (sq.km)	River Length (km)	Basin Name	Basin area (sq.km)	River Length (km)
Ganga	861,452	2,525	Cauvery	81,155	760
Kutch and Saurashtra (incl Luni)	321,851	495	Tapi	65,145	724
Indus	321,289	2,900	Tadri - Kanyakumari	56,177	NA
Godavari	312,812	1,465	Tapi - Tadri	55,940	NA
Krishna	258,948	1,400	Pennar	55,213	597
Brahmaputra	194,413	916	Brahmani and Baitarni	51,822	480
Mahanadi	141,589	851	Barak and others	41,723	900
Pennar - Kanyakumari	100,139	597	Mahi	34,842	583
Narmada	98,796	1,290	Subernarekha	29,196	470
Mahanadi - Pennar	86,643	890	Sabarmati	21,674	371

Source: CWC

Key benefits of NRLP

- **Avoiding huge losses of life, property, and national wealth** that occur because of droughts and/or floods that occur across the country each year
- **Irrigation of incremental 35mn ha. of land** – 25mn ha. through surface water and 10mn ha. through higher use of ground water
- **Potential to increase agriculture production by 100% over the next five years** – leading to the annual average income of farmers increasing to over US\$ 500 per acre, from the current US\$ 40 per acre
- **Generation of 34GW of hydropower** – leading to lower dependence on fossil fuels like coal and LNG
- **Providing employment to 1mn people** over the next 10 years
- **Providing a boost to the consumption of steel and**

cement, over the next ten years

- The 15,000km of canal systems can facilitate **inland water navigation** (although this remains a distant secondary objective of the project).

Key challenges for NRLP

- **Environmental cost** (deforestation, soil-erosion etc)
- **Rehabilitation** (and the prospective protests surrounding it)
- **Social unrest and psychological damage** due to forced resettlement of PAP (Project Affected People)
- **Political consensus:** Water being a state subject – NRLP will have to be executed by individual states. Managing water-sharing agreements between them will be an uphill task

The Himalayan Component

The Himalayan component of the NRLP consists of 14 links that propose to inter-connect and transfer surplus water from the Brahmaputra and the Ganga basin to the peninsular rivers. The idea is to ensure that the surplus water available in the Himalayan rivers in the monsoons is channelized to deficit regions (currently, this excess water results in drowning villages close to the banks). Most Himalayan rivers are perennial, so the Himalayan component will provide a lion's share of hydropower capacity (24 GW of the total 34GW expected) from the interlinking project.

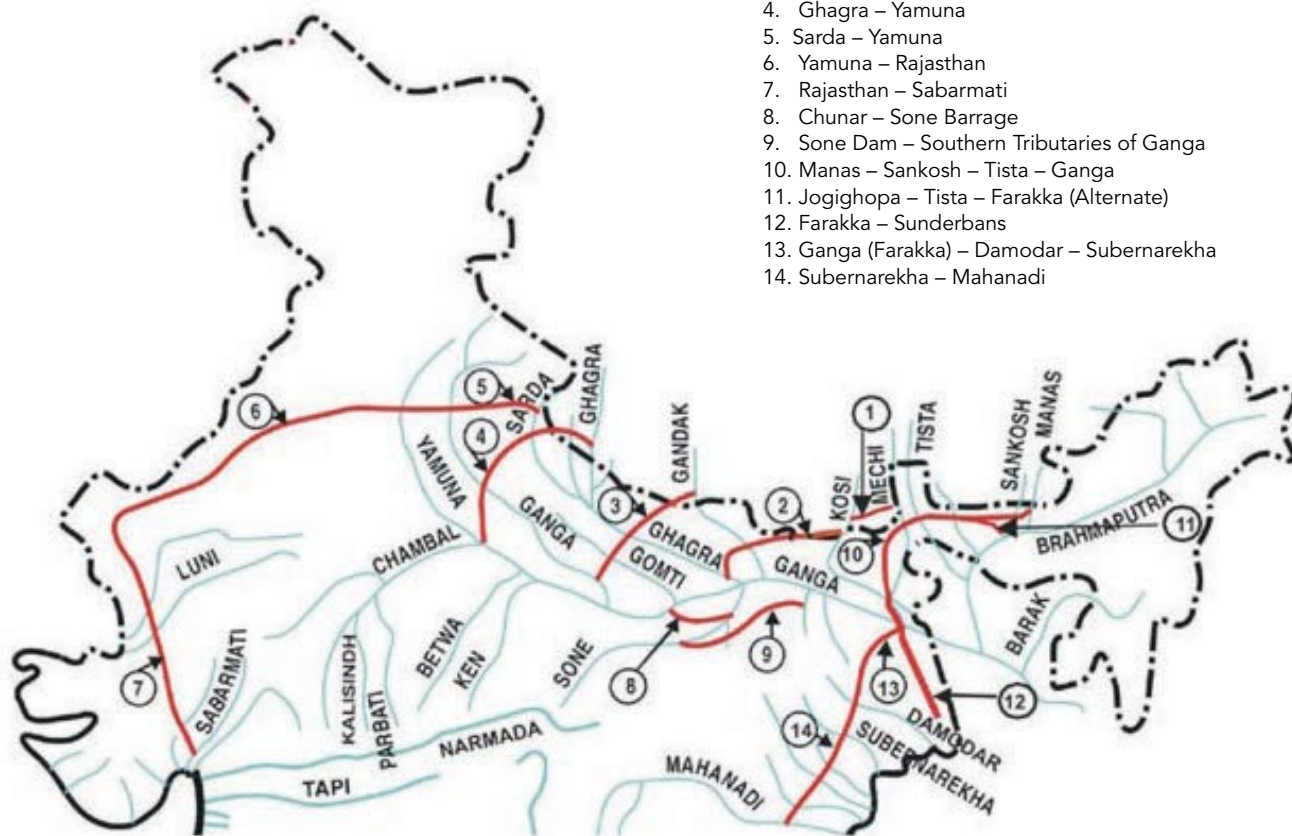
Key links in the Himalayan component are:

- 1) **Manas-Sankosh-Tista-Ganga:** This is, by far, the most ambitious and difficult to execute link. It seeks to connect the three tributaries of the Brahmaputra (Manas, Sankosh, and Tista) to the Ganga. It will be built across three states

– Assam, Bihar, and WB – irrigating 0.65mn ha. and generating 5.3GW of hydro power. The execution of this project will be a challenge, considering the terrain. The project might also face hurdles in the form of opposition from China (Brahmaputra runs as river Tsangpo in China) and Bhutan (though Bhutan shouldn't be much of a problem as per GV's interaction with a Central Water Commission member).

- 2) **Kosi-Mechi and Kosi-Ghagra:** Two links on either side of the river Kosi will seek to distribute its surplus flow to the rivers Mechi and Ghagra, helping to irrigate areas in Bihar (1.2mn ha.), WB (0.175mn ha.), and UP (67,000 ha.). It is interesting to note that the river Kosi has changed its course significantly over the last few decades, and these links, which are still in consensus-building stage, might see significant modifications after reaching the DPR stage.

NRLP - The Himalayan Component



1. Kosi – Mechi
2. Kosi – Ghagra
3. Gandak – Ganga
4. Ghagra – Yamuna
5. Sarda – Yamuna
6. Yamuna – Rajasthan
7. Rajasthan – Sabarmati
8. Chunar – Sone Barrage
9. Sone Dam – Southern Tributaries of Ganga
10. Manas – Sankosh – Tista – Ganga
11. Jogighopa – Tista – Farakka (Alternate)
12. Farakka – Sunderbans
13. Ganga (Farakka) – Damodar – Subernarekha
14. Subernarekha – Mahanadi

- 3) **Gandak-Ganga:** This is expected to be the most beneficial link in the entire NRLP – it will add an incremental irrigation area of 3.8mn ha. in Uttar Pradesh. It seeks to connect the lower tributary of the Ganga (Gandak, at the Indo-Nepal border) to the upper basin of the main river itself in UP. Nepal is also likely to add 0.2mn ha. to its irrigated area because of this project.
- 4) **Ghagra-Yamuna:** This link will connect Ganga's tributary Ghagra to the Yamuna – all in Uttar Pradesh. This should be the easiest to execute, given that it doesn't require consensus with any other state government. This project has the potential to add 11GW of hydropower capacity.
- 5) **Yamuna-Rajasthan and Rajasthan-Sabarmati:** These two contiguous links challenge the carvings of nature and seek to connect the Yamuna to the Sabarmati through Rajasthan. In terms of magnitude and nature of catchment area, these links should have a significant impact – they seek to take water to the desert state of Rajasthan, which suffers droughts every year.
- 6) **Ganga-Subernarekha and Subernarekha-Mahanadi links:** This is where the heart of this entire project lies – connecting the rivers in the northern part of the country to the southern part – the Himalayan basin to the Peninsular basin. The two contiguous links will connect the river Ganga to Mahanadi. Mahanadi, in-turn, is envisaged to be connected (many intra-state links already present) to the major rivers of the Indian peninsula – Krishna, Godavari and Cauvery – through the peninsular component. The direct benefit of this project is lower than other links (only 0.9mn ha. irrigation and negligible hydropower generation) but the indirect benefits of the surplus of northern rivers, to be diverted to the entire southern region, are immense.
- 7) **Farakka-Sunderbans:** This link, completely in West Bengal, is being built solely to channel excess water in the rivers Ganga and the

Brahmaputra into the Sunderbans delta – mainly to avoid floods in the catchment areas.

- 8) **Other links:** Other links like Chunar-Sone, Sone-Ganga, and Sarda-Yamuna are smaller

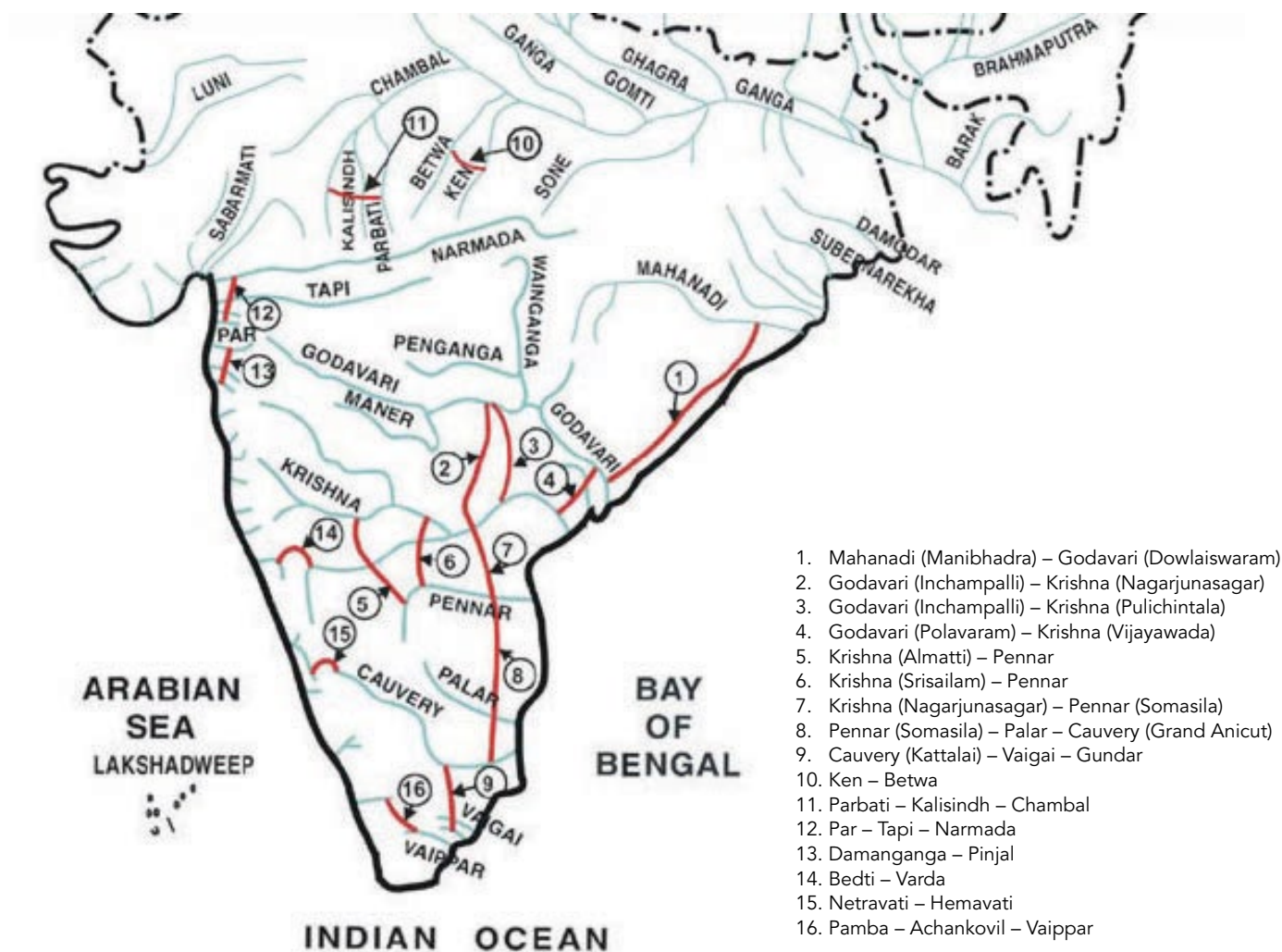
links in themselves, generating limited irrigable area and hydropower capacity. However, in the overall scheme of the project, they contribute significantly in managing excess water-flow in the Himalayan basin.

The Peninsular Component

The Peninsular component of the NRLP consists of 16 links that envisage inter-connecting and managing the water flow of the peninsular rivers. This focuses more on the east-flowing rivers (Krishna, Godavari, Mahanadi, and Cauvery) rather than the west-flowing rivers (Narmada

and Tapi). Under this component, only two links are proposed on west-flowing rivers and two are on rivers in Madhya Pradesh and Uttar Pradesh. The rest of the 12 links are for east-flowing rivers, benefitting Orissa, Karnataka, Andhra Pradesh, Telangana, Tamil Nadu, and Kerala. It is important

NRLP - The Peninsular Component



to note that these states see the highest volatility in terms of water-related disasters – they are hit by floods during the monsoons and by droughts in the dry months.

Given the fragmented political landscape of this region, consensus-building will be a tough exercise. We have already seen how the state government of Tamil Nadu has been defying the Supreme Court order on the Cauvery water-sharing arrangement. Getting these states on-board to accept mega projects like the river-link project – which propose long-term benefits but short-term pain (rehabilitation etc.) – could prove onerous.

Key links in the Peninsular component are:

- 1) **Mahanadi-Godavari:** This link will connect the two northernmost rivers of the southern half of the country. It will provide significant relief to regions in Odisha and Andhra Pradesh (affected by floods every year) by diverting excess water-flow towards the south and west. Significant irrigation benefits (0.44mn ha. of area) are expected through this link.
- 2) **Three links between Krishna and Godavari:** As many as three links are envisaged between Krishna and Godavari rivers, through Odisha and Andhra Pradesh. This is despite the presence of the mega dam (Nagarjunasagar) present on the Krishna river. These links will provide huge relief to areas of Andhra Pradesh that are perennially impacted by floods. A mammoth 1.5mn ha. of incremental area could be irrigated through these links.
- 3) **Three links between Krishna and Pennar:** Three links are also envisaged between Krishna and Pennar rivers. These links will pass through Andhra Pradesh and Karnataka and provide relief to areas of AP that are perennially hit by floods.
- 4) **Pennar-Cauvery:** This link is the final one, connecting all four large east-flowing rivers of southern India – Mahanadi-Krishna-Godavari-Cauvery. In fact, this link is envisaged to be built as a continuation of links 17 (Godavari-Krishna) and 21 (Krishna-Pennar). It will impact AP, Tamil Nadu, and Puducherry.
- 5) **Ken-Betwa:** This link envisages to provide relief from drought to parched areas of MP by linking the two Yamuna tributaries – Ken and Betwa. The project is in most advanced stages (DPR prepared and approved, environmental clearances obtained), and with favourable governments in both states (NDA), it could soon start execution.
- 6) **Parbati-Chambal:** This link, just like Ken-Betwa, is expected to provide relief to drought-affected areas in MP and Rajasthan. Just like Ken-Betwa, it should also see some action soon, with favourable government in both states (NDA).
- 7) **Par-Tapi-Narmada and Damanganga-Pinjal:** These links attempt to connect five west-flowing rivers in Gujarat and Maharashtra. The main objective is to prevent excess water from flowing into the Arabian Sea and harness it to provide relief to drought-affected areas in Gujarat, and also to the city of Mumbai. The projects are in advanced stages, with DPR already prepared and approved, and environmental clearances obtained. With a favourable government in both states now (NDA), the project is likely to start execution soon.
- 8) **Other links:** There will be three small links between small tributaries of east and west flowing rivers in Karnataka and Tamil Nadu. The projects are in very early stages, and it could be a while before they see action (also because of the volatile political environment in the concerned states).

Global examples

Inter-Basin Water Transfers

- **California State Water Project:** SWP is a state water-management project for diverting water from better-watered northern California to the drier central and southern parts of the state. It provides drinking water to more than 23mn people and generates 750MW of hydroelectricity. About 70% of the water is used for urban areas and industry in Southern California and the San Francisco Bay area, while 30% is used for irrigation in the central valley.



California state water project, USA

- **The Texas Water Plan:** This plan was started in 1961 to redistribute water in Texas and New Mexico. In the first ten years, the state built 2,700 dams to provide water supply. Those dams now account for about 40% of all

dams in Texas. The plan has been revised ten times since it started, to modify it according to the changing needs of water distribution with increasing population.

- The water of the **Colorado River** (an international river between USA and Mexico) is supplied outside the basin to the Imperial Valley in California, which receives 3.1 MAF of water annually (as part of multi-state agreements executed in 1920-30s). About 180,000 people in the Imperial Valley receive approximately 70% of California's allocation of water from the Colorado River.
- **Mahaweli-Ganga Development Programme in Sri Lanka:** This is the largest integrated rural development multi-purpose programme ever undertaken in Sri Lanka and was based on water resources of Mahaweli and six allied river basins.



Mahaweli-Ganga Development Programme, Sri Lanka

The main objectives were to increase agricultural production, hydropower generation, employment opportunities, and settlement of landless poor and flood control. The Mahaweli River Basin covers 10,000 sq. km (roughly 15% of Sri Lanka's land area).

- **The Irtysh Karganda scheme, Kazakhstan:** It connects the Irtysh River with Karganda, a major industrial center in north-central Kazakhstan. The construction of the canal was started in 1962 and completed in 1974.
- **The Lingua Canal** was completed in China in 214 BC and the Grand Canal was completed in 605 AD. Besides, many projects have been recently completed. Diversion of the Quiantang river water, diversion of Yellow river surplus and South to North transfer are few of the proposed projects in China.
- **Pakistan** built a network of river links as a part of Indus Treaty Works, which function as replacement links to irrigate those areas that were deprived of irrigation (after the partition), when three eastern rivers of Indus system (Sutlej, Ravi, and Beas) were allocated to India. Pakistan built ten links, six barrages, and two dams during the post-treaty period of 1960-1970. Most of the links built are unlined channels.

The National River Linking Project

Sl No	Name	Beneficiary states	Irrigation potential (lakh hectare)**	Hydropower (MW)	Status
1	Manas-Sankosh-Tista-Ganga (M-S-T-G) link	Assam, West Bengal & Bihar	$2.08+1.82+2.64=6.54$	5,287	FR in progress
2	Kosi-Ghaghra link	Bihar & Uttar Pradesh	$8.17+0.67+1.74$ (Nepal)= 10.58	-	FR in Indian portion in progress
3	Gandak-Ganga link	Uttar Pradesh	$37.99+2.41$ (Nepal)= 40.40	-	Draft FR completed (for Indian portion) and FR in progress
4	Ghaghra-Yamuna link	Uttar Pradesh	$25.30+1.35$ (Nepal)= 26.65	10,884	FR completed (for Indian portion)
5	Sarda-Yamuna link	Uttar Pradesh & Uttarakhand	$3.45+0.30=3.75$	3,600	FR completed (for Indian portion)
6	Yamuna-Rajasthan link	Haryana & Rajasthan	$0.435+2.442=2.877$	-	Draft FR completed and FR in progress
7	Rajasthan-Sabarmati link	Rajasthan & Gujarat	$5.35+2.04=7.39$	-	Draft FR completed and FR in progress
8	Chunar-Sone Barrage link	Bihar & Uttar Pradesh	$0.30+0.37=0.67$	-	Draft FR completed and FR in progress
9	Sone Dam-Southern Tributaries of Ganga link	Bihar & Jharkhand	$2.99+0.08=3.07$	95	FR in progress
10	Ganga (Farakka)-Damodar-Subernarekha link	West Bengal, Odisha & Jharkhand	$7.63+0.30+0.55=8.48$	-	Draft FR completed and FR in progress
11	Subernarekha-Mahanadi link	West Bengal & Odisha	$0.18+0.365=0.545$	9	Draft FR completed and FR in progress
12	Kosi-Mechi link	Bihar	$2.99+1.75$ (Nepal)= 4.74	3,180	PFR completed. FR to be taken up entirely lies in Nepal
13	Farakka-Subderbans link	West Bengal	1.5	-	Draft FR completed
14	Jogighopa-Tista-Farakka link (J-T-F) link	Assam, West Bengal & Bihar	0	1,115	Alternative to M-S-T-G link. Not to be taken up
15	Mahanadi (Manibhadra)-Godavari (Dowlaiswaram) link	Andhra Pradesh & Odisha	$0.91+3.52=4.43$	445	FR completed
16	Godavari (Inchampalli)-Krishna (Pulichintala) link	Andhra Pradesh & Odisha	6.13	0	FR completed
17	Godavari (Inchampalli)-Krishna (Nagarjunasagar) link	Andhra Pradesh & Odisha	2.87	975	FR completed
18	Godavari (Polavaram)-Krishna (Vijayawada) link	Andhra Pradesh	5.82	0	FR completed. The State Government proposes to complete this Project by 2018
19	Krishna (Almatti) Pennar link	Andhra Pradesh & Karnataka	$1.90+0.68=2.58$	0	FR completed
20	Krishna (Srisailem) - Pennar link	Andhra Pradesh & Karnataka	0	17	FR completed
21	Krishna (Nagarjunasagar)-Pennar (Somasila) link	Andhra Pradesh & Karnataka	5.81	90	FR completed
22	Pennar (Somalisa)-Cauvery (Grand Anicut) link	Andhra Pradesh, Tamil Nadu & Puducherry	$0.49+4.36+0.06=4.91$	0	FR completed
23	Cauvery (Kattalai)-Vaigai-Gundar link	Tamil Nadu	3.38	0	FR completed
24	Ken-Betwa link				
	a) Ken-Betwa link Phase-I	Uttar Pradesh & Madhya Pradesh	$2.66+3.69=6.35$	78	DPR Phase-I completed in April 2010
	b) Ken-Betwa link Phase-II	Madhya Pradesh	0.99		DPR Phase-II completed in January 2014
25	Parbati-Kalisindh-Chambal link	Madhya Pradesh & Rajasthan	Alt I: $2.05+0.25=2.30$ Alt II: $1.77+0.43=2.20$	0	FR completed. DPR not yet taken up by NWDA for want of consensus
26	Par-Tapi-Narmada link	Gujarat	1.69	32.5	DPR completed in August 2015
27	Damanganga-Pinjal link	Maharashtra (only water supply to Mumbai)	0	0	DPR completed in March 2014
28	Bedti-Varda link	Karnataka	0.6	4	PFR completed
29	Netravati-Hemavati link	Karnataka	0.34	0	PFR completed
30	Pamba-Achankovil-Vaippar link	Tamil Nadu	0.91	508	FR completed

Source: CWC (**1 mn = 10 lakh; FR - Feasibility Report; DPR - Detailed Project Report, Irrigation and Hydropower figures worked out on the basis of FRs - could change at DPR stage)

NRLP - Proposed Inter Basin Water Transfer Links



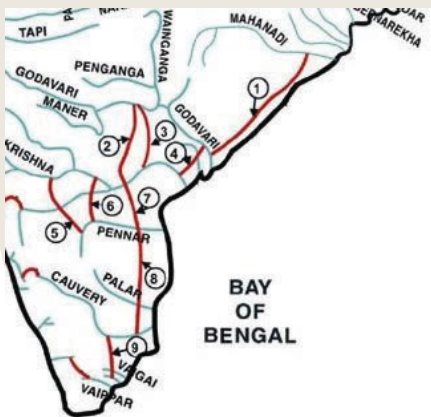
Source: CWC

The 'mother link' on the east coast

The peninsular component of the NRLP, apart from other small links, primarily focuses on connecting five large east-flowing rivers – Mahanadi, Godavari, Krishna, Pennar, and Cauvery. The objective of these nine links is to transfer the surplus waters of the Mahanadi and Godavari rivers to the deficit basins of Krishna, Pennar, Cauvery, and Vaigai.

These nine links envisage building multiple dams and over 3000km of canals over the five rivers. Interestingly, the rivers Mahanadi and Godavari already have some of the largest dams in India – Nagarjunsagar, Srisailem, Dowlaiswaram, and Prakasam. Despite these, the Mahanadi and Godavari rivers are flooded every year, leading to significant loss of life and property in Odisha, Andhra Pradesh, and Telangana.

Through the three links between Mahanadi and Krishna, a major portion of the surplus quantity diverted is to be discharged into Nagarjunasagar reservoir for further diversion



to water-deficit Pennar and Cauvery basins, after meeting the entire deficit of the Krishna basin. Since the water cannot be diverted to the Nagarjunasagar reservoir by gravity

(because of the topography), a series of pumping stations in four stages have been proposed along the canals, for lifting the water to a static head of about 107m.

Through the three links envisaged between Krishna and Pennar, the water received from the NSRBC and NSLRC (Nagarjunasagar Right Bank and Left Bank Canals) will be diverted to needy areas of Pennar basin, and the leftover surplus to the Cauvery basin. The southern links, particularly, will provide water to the needy areas, and hence add significant amount of irrigated areas.

However, these links will be the most difficult to execute. Three of the nine links do not envisage any reservoir construction, so there will be minimum displacement of PAP (project affected people) and hence minimum rehabilitation requirements. However, the other six links will add 47 BCM of reservoir capacity – which will lead to significant rehabilitation requirement. Also, the nine links are to be built by, and with the consensus of, seven states – which have historically been involved in multiple water-sharing disputes. Lastly, all of these states have a unique political landscape, dominated by local parties, which will be extremely difficult to bring together on a common platform. The only hope that one can have is that the ruling dispensations of these states realise the real, short- and long-term benefits of these projects and set aside their petty differences for the greater good. Perhaps too much to ask for in the current political environment !

The nine critical links on the east coast

Sl. No.	Project	Rivers	State	Dams Capacity (MCM)	Canals Length (km)	Irrigation Area (mn ha)	Hydro power (MW)	Cost (Rs bn)	IRR
1	Mahanadi (Manibhadra)-Godavari (Dowlaiswaram)	Mahanadi/Godavari	AP/Odisha	6,000	828	0.44	802	175.4	12.8%
2	Godavari (Inchampalli)-Krishna (Nagarjunasagar)	Godavari/Krishna	Telangana	10,374	299	0.61	413	262.9	14.8%
3	Godavari (Inchampalli)-Krishna (Pulichintala)	Godavari/Krishna	Telangana	10,374	312	0.29	237	50.5	19.3%
4	Godavari (Polavaram)-Krishna (Vijayawada)	Godavari/Krishna	AP	5,325	186	0.58	162	14.8	NA
5	Krishna (Almatti) - Pennar	Krishna/Pennar	AP	3,430	587	0.26	56	66.0	9.5%
6	Krishna (Srisailem) - Pennar	Krishna/Pennar	AP/Telangana	NA	204	-	-	0.8	25.6%
7	Krishna (Nagarjunasagar)-Pennar (Somasila)	Krishna/Pennar	AP	11,560	203	0.58	124	63.0	NA
8	Pennar (Somalisa)-Cauvery (Grand Anicut)	Pennar/Cauvery	AP/TN	NA	529	0.49	1,105	67.0	NA
9	Cauvery (Kattalai)-Vaigai-Gundar	Cauvery/Vaigai	TN	NA	256	0.34	185	26.7	NA

Source: CWC

Recent developments, status, and way forward

After the advent of the NDA government at the centre in 2014, the NRLP started seeing some action. On 23rd September 2014, a 'Special Committee for Inter-linking of Rivers' was constituted. The first meeting of this committee was held on 17th October 2014, which was attended by state irrigation/water resources ministers along with the secretaries of various state governments. The meeting decided to constitute sub-committees to expedite objectives of the inter-linking of rivers. Subsequently, the committee met five times over the next one year to review the progress. On 14th April 2015, the Ministry of Water Resources constituted a 'task force' on inter-linking of rivers, comprising of experts and senior officials. Chaired by Mr B.N. Navalawala, the task force was to expedite the work on the inter-linking of rivers. Its key responsibilities were:

- To consider alternative plans in place of infeasible links in the present plan and examine existing links.
- To facilitate inter-linking of intra-state and intra-basin rivers along with inter-state and inter-basin links.
- To recommend the schedule for completion of feasibility studies and DPRs of all links, implementation schedule of all links, and suggest means of funding.
- To provide guidance on appraisal norms for individual projects in terms of economic viability, socio-economic and environmental impact, and resettlement plans.
- To device suitable mechanisms for bringing about speedy consensus amongst states and proposing suitable organisational structures for implementing inter-linking.

Two meetings of the task force were held in April 2015, and in November 2015. Over the last two years, the task force has managed to build consensus on multiple issues, and has made remarkable progress. DPRs for five of the 30 links are prepared and approved. Three of those five have also received environmental and forest clearances and project costs have been finalised. The three projects – Ken-Betwa, Par-Tapi-Narmada, and Damanganga-Binjal – are in late stages of approval and could see order award activity in late 2017. For the remaining 25 links, feasibility reports are being prepared or have been prepared.

Some of the key issues faced by the task force in some of the links are:

Himalayan component

- 1) The proposed storage and initial reaches of five water transfer links (Kosi-Mechi, Kosi-Ghagra, Gandak-Ganga, Ghagra-Yamuna and Sarda-Yamuna) fall in Nepal and that of Manas-Sankosh-Tista-Ganga and Jogighopa-Tista-Farakka fall in Bhutan. To carry out surveys and investigations in Nepal and Bhutan, permission of the respective countries is essential.
- 2) In 2004, the Bangladesh government had raised concerns about India's NRLP, after which, in a meeting of the Indo-Bangladesh Joint River Commission held in Dhaka (19-21 September 2005), the Indian government had assured that it would not take any unilateral decision on the Himalayan component of the proposed NRLP that may affect Bangladesh.

Both these issues are being currently resolved with the help of Ministry of External Affairs (MEA).

Peninsular component

- 1) Parbati-Kalisindh-Chambal link: The government of MP wants to implement intra-state links instead of this inter-state link with Rajasthan.
- 2) Mahanadi-Godavari: The government of Odisha was not in favour of this link due to large submergence involved in Manibhadra dam. Based on the suggestions of the Government of Odisha's Water Resources Department, the NWDA has prepared a preliminary revised proposal of the link with reduced submergence (submitted to Odisha government).
- 3) Bedti-Varda, Pamba-Achankovli-Vaippar, and Netravati-Hemavati links: The governments of Karnataka and Kerala have raised objections to these links.

The NWDA is trying to build consensus for objections, especially the first two links. The first link is important for providing relief to drought-affected areas of Rajasthan and MP and the second is the mother link of the nine link-system on the east coast.

Building consensus – **The political way**

The biggest hurdle in executing a pan-India project of this nature is building a political consensus. Irrigation is a 'state subject' – the central government cannot execute such projects without the permission of the respective state governments. In fact, the link projects have to be executed by the various state governments under the 'guidance and support' of the centre. However, a fragmented mandate till 2014, and various states being under the rule of different political parties, meant that political consensus was impossible to build (it also appears that the UPA-1 and UPA-2 governments didn't even try for a consensus).

After the NDA came to power at the centre in 2014,

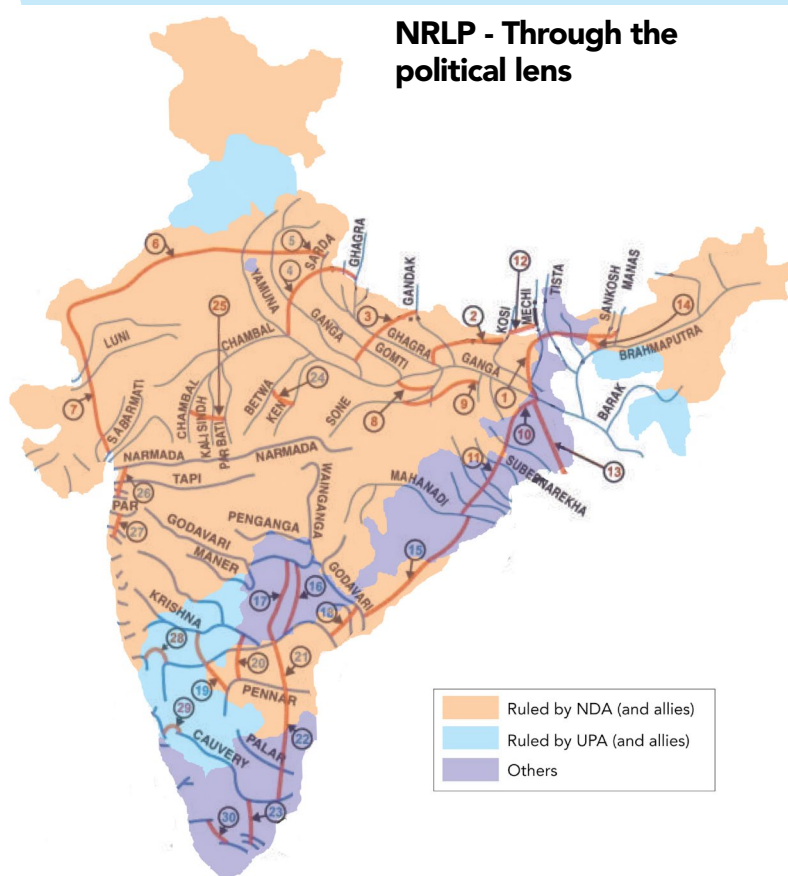
the political scenario has changed significantly, especially over the last two years. As many as 21 states went through legislative assembly elections over the last two years, and most saw a change in regime. As a result, the NDA rules as many as 18 out of India's 29 states currently (in addition to being at the centre). The NRLP project is expected to receive a significant boost with the election results of the last two years. A prime example of this is the Ken-Betwa link – as long as Uttar Pradesh remained under the rule of a local party (SP), the project saw little progress (with the then UP government not 'interested' in the proposal). The other beneficiary state, Madhya Pradesh (NDA governed), was already on board. The NDA came to power in Uttar Pradesh in March 2017, and the project has seen rapid progress – the Ken-Betwa link is likely

to be the first one awarded under NRLP.

Currently, virtually the entire northern part of India is under NDA's 'control', with the exception of Punjab and Himachal Pradesh. The Himalayan component of the NRLP is likely to see significant progress now, with political consensus looking easier to achieve. Most links in the Himalayan component need the approval of neighbouring countries (Nepal, Bhutan, and Myanmar) which

Currently, NDA rules as many as 18 out of India's 29 states

the CWC is already actively working on. However, the southern peninsula still remains fragmented, with local parties ruling four of the five south-eastern states. The most important part of the project – the nine links that would connect the basins of the Mahanadi, Godavari, Krishna, and Cauvery rivers – still pose an ominous challenge, one that is unlikely to be resolved easily.



Ken-Betwa Link

Objective and need for the project

The main objective of the Ken-Betwa link project is to make water available to deficit areas of the upper-Betwa basin through substitution from the surplus waters of the Ken basin. As per an NWDA study, the Ken river basin (up to the Greater Gangau dam site) was found to be water surplus. Accordingly, a toposheet study and preliminary feasibility study of the Ken-Betwa link were carried out.

Development timeline

The feasibility report for Ken-Betwa Link was prepared by the NWDA in 1995 after which efforts were made by NWDA, CWC, and the Ministry of Water Resources to arrive at a consensus between the two beneficiary states – Uttar Pradesh (UP) and Madhya Pradesh (MP). Finally, a consensus did come through and the centre and concerned parties (MP, UP, and the Union Government) signed a tripartite Memorandum of Understanding on 25th August 2005 for preparing a Detailed Project Report (DPR) for the link.

The Ministry of Water Resources entrusted the DPR work to NWDA in January 2006. Three years later, during a secretary-level meeting (February 2009) it was decided that the DPR would be prepared in two phases – in phase-1, Daudhan Dam and its appurtenant works, two tunnels, two power houses, and a link canal would be included; phase-2 would comprise projects proposed by the MP government in the Betwa Basin. The DPR for phase-1 was completed by NWDA in April 2010 and circulated to concerned state governments.

Constitution of the project

Two dams (Daudhan and Makodia) and two barrages (Kesari and Barari) are proposed under this link. Due to topographical constraints, sufficient command would only be possible after proposing a lift up to 425m for Barari and 410m for Kesari barrage. Therefore, MDDL (minimum drawdown level) of both barrages are tentatively fixed as 401m. Two powerhouses are proposed in Daudhan Dam Complex. Phase-1 will have an installed capacity of 60 MW (2 x 30 MW) whereas the second phase will have 18 MW (3 x 6 MW).

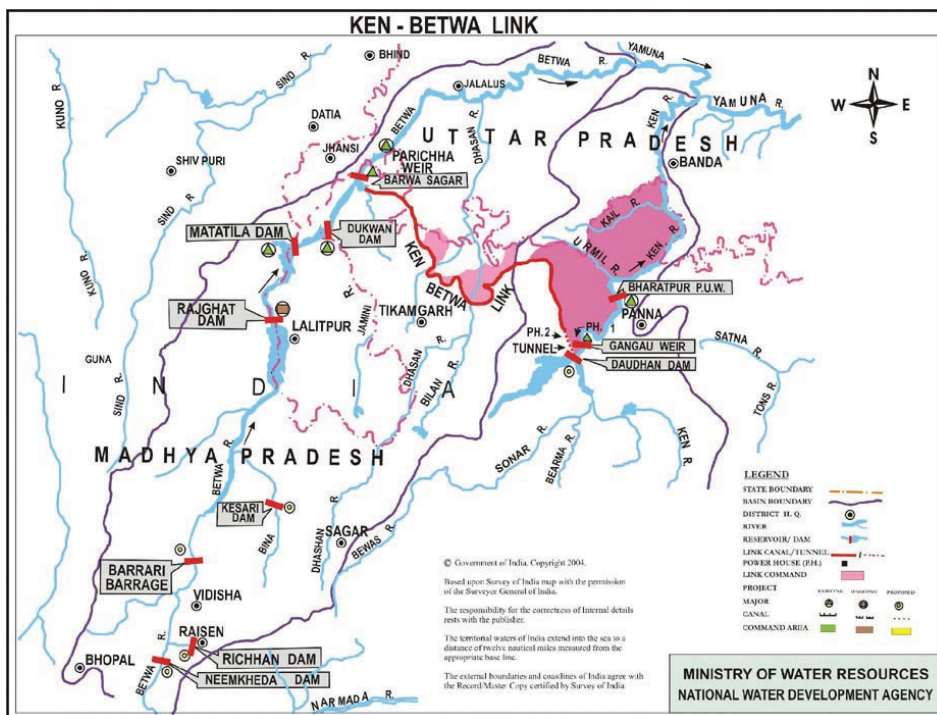
Out of the total divertible quantity of 1074 MCM, 366 MCM of water (277 MCM for MP and 89 MCM for UP) will be used for en-route irrigation of 60,000 ha. in the districts of Tikamgarh and Chhatarpur of MP and Mahoba and Jhansi of UP, with 100% intensity of irrigation. After taking into account the requirement of en-route water-supply needs (49 MCM) and transmission loss of 68 MCM, the balance 591 MCM of water will be delivered in to the Betwa river, upstream of the Parichha weir.

Out of this 591 MCM, about 273 MCM of water, by way of substitution, will be used through the proposed projects – Makodia, Kesari, and Barari barrages – for irrigation of 62,000 ha. in the Upper Betwa sub-basin. The area that will benefit through these projects lies in Raisen and Vidisha districts of MP. The government of MP is expected to plan new projects for utilisation of remaining water.

It is proposed to provide 398 MCM of water to MP for irrigation in the Ken command through the Bariarpur pick-up weir across the Ken river, located downstream of Daudhan dam, which will irrigate an area of 68,300 ha. Similarly, 1,007 MCM of water is proposed for irrigation of 0.17 mn ha. in MP through the left bank canal (taking off from the tail-end of lower level tunnel), upstream of Daudhan dam.

Because of this project, a large area of Bundelkhand (330,000 ha. of MP and 14,000 ha. of UP) is expected to come under assured irrigation – which will increase agricultural production and productivity in the area.

- Environmental and ecological angle: No major adverse impact anticipated due to the project, except submergence of Panna Tiger Reserve.
- No significant rich mineral deposits identified in the catchment; hence, no acidification of the Daudhan and Makodia reservoirs is anticipated. Necessary minimum flows in the Ken river during the lean season will flush untreated sewage; hence, no impact is forthcoming on river water quality.
- The flooding of previously forested and agricultural land in the submergence area is expected to increase the



- No possibility of leakage in the bed of the reservoir is anticipated, as it is covered by semi quartzitic sandstone, which is compact and hard. Hence, the reservoir can be considered water tight.
- The water-samples tests indicate that the organic and heavy metal components in the water are within permissible limits.
- No historic monuments of archaeological importance will submerge under the Daudhan and Makodia reservoirs.
- A provision of Rs 12.5bn has been kept in the estimate towards the Environment Management Plan.

LATEST PROJECT COST: Phase 1 - Rs 180.6bn

nutrients due to decomposition of vegetative matter. Enrichment of impounded water with organic and inorganic nutrients will be a main water-quality issue, which is expected to last for a short duration of few years from the filling up of the reservoir.

- No eutrophication problem anticipated due to controlled use of fertilisers in the command. The ground-water level is expected to increase in the adjoining area due to assured water supply to the fields.

Ken Betwa Phase 2:

The NWDA started preparing the phase-2 DPR in January 2011 and completed it in a record time of three years in January 2014. The project is mainly an irrigation scheme, with a small component of drinking-water supply. It consists of a dam (Lower Orr), four barrages (Neemkheda, Barari, Kotha, and Kesari) and a network of canal systems. The project will provide irrigation to an area of 98,847 ha. in Shivpuri, Raisen, Vidisha, Sagar, and Ashoknagar districts of MP, and drinking water supply to 0.16 mn population of Shivpuri (MP).

Project Cost & Financial Viability (as per DPR, 2007-08 prices for Phase I, 2012-13 Phase II)

Project (Rs mn)	Ken Betwa - I	Ken Betwa - II	Financial Viability	Ken Betwa - I	Ken Betwa - II
Total Project Cost - Breakup			Net return from agricultural produce	15,419	3,714
Head Works	42,483	14,829	Rev from Power sale	657	0
Canals and Conveyance system	29,955	7,524	Rev from Water Supply	16	2
Power Installations	3,416	312	Others	102	5
Command Area Development	292	165	Total revenue	16,194	4,255
Others	0	0	Annual Cost (depcn, interst etc)	9,442	2,719
Total	76,146	22,829	IRR	13.00%	14.87%

Source: CWC

Par Tapi Narmada Link

Objective and need for the project

The main objective of the Par-Tapi-Narmada Link Project is to transfer water from the water-surplus regions of the Western Ghats to the water-deficit regions of Saurashtra and Kutch. The project will also cater to the command areas of five projects – Khuntali, Ugta, Sidhumber, Khata Amba, Zankhari – proposed by the Government of Gujarat. This link will serve:

- Command in tribal areas of Chhota Udepur and Panchmahal districts from Narmada Main canal on substitution basis
- Tribal dominant districts of Dang and Valsad of Gujarat, and Nasik district of Maharashtra
- Drinking water for most of the villages in the vicinity
- Filling of most of panchayat tanks/check dams.

There is a wide variation in distribution of water resources in different regions of Gujarat due to variation in rainfall, which is very scanty in Saurashtra and Kutch and the area is frequently affected by droughts. Par, Auranga, Ambica, Purna, and Mindhola are important west-flowing rivers in the Western Ghat region (north of Mumbai, and south of Tapi) in southern Gujarat. All these rivers originate in Maharashtra, and after flowing through the state and through Gujarat, they outfall into the Arabian sea. Only about 14% of the catchment area of these rivers lies in Maharashtra and the remaining 86% lies in Gujarat.

Out of total 38,100 MCM of estimated utilisable surface water resources in Gujarat, the ones in south and central Gujarat are 31,750 MCM (83%). However, there is large variation in per-capita water availability in different regions of the state. The per-capita water availability in south and central Gujarat is about 1,100 m³ (2011 census) and it is about 600 m³ in Saurashtra and Kutch. With the anticipated growth of population in the state by 2050, the availability should reduce further. The rivers in Saurashtra and Kutch are mostly dry through the year, whereas sizeable quantum of flows of Par, Auranga, Ambica, and Purna rivers situated in south Gujarat are going to sea unutilised every year.

In the light of the above scenario, the Par-Tapi-Narmada Link Project is envisaged to transfer the surplus flows from west-flowing Par, Auranga, Ambica and Purna rivers between Par and Tapi to water deficit drought-prone regions lying on both sides of the link canal, towards the north, including tribal

areas, and up to drought-prone Saurashtra and Kutch regions.

Development timeline

The feasibility report of the Par–Tapi–Narmada link project was prepared by NWDA in October 2005, and circulated to the concerned state governments (Gujarat and Maharashtra) and members of Technical Advisory Committee (TAC) of the NWDA. Since then, continuous efforts were made by NWDA, CWC, and Ministry of Water Resources to arrive at a consensus between two beneficiary states, which eventually resulted in an agreement to prepare a Detailed Project Report (DPR).

A tripartite MoU was signed by Gujarat, Maharashtra, and the Union Government on 3rd May 2010 for preparing a DPR, which the NWDA completed in August 2015 and sent to the water resources departments of both state governments. The issues of water-sharing and power-sharing between Gujarat and Maharashtra were discussed at multiple levels over the next year. The Union Minister for Water Resources also held meetings with the Maharashtra chief minister at Mumbai on 3rd May 2016 (discussed Damanganga-Pinjal and Par-Tapi-Narmada Link Projects among other issues).

Constitution of the project

The link project includes six reservoirs proposed in north Maharashtra and south Gujarat. The water from the proposed reservoirs would be taken through a 406km-long canal, including the 33km length of the feeder canals, to take over a part of the command of the Sardar Sarovar Project, while irrigating small en-route areas. The project comprises construction of six dams:

- Jheri Dam across river Par in Peint taluka of Nasik district in Maharashtra
- Paikhed Dam across river Nar – a tributary of river Par
- Chasmandva Dam across river Tan – tributary of river Auranga – all in Dharampur taluka of Valsad district in Gujarat
- Chikkar Dam across river Ambica
- Dabdar Dam across river Khapri – a tributary of river Ambica
- Kelwan Dam across river Purna – all in Ahwa taluka of Dang district in Gujarat.

Construction of two diversion barrages – one each in the

downstream of Paikhed and Chasmandva dams, six powerhouses and a 406km-long link-canal (including feeder pipeline and tunnels along the link canal) connecting all six dams with the existing Miyagam branch canal (of the Narmada canal system from the Sardar Sarovar Project) are envisaged.

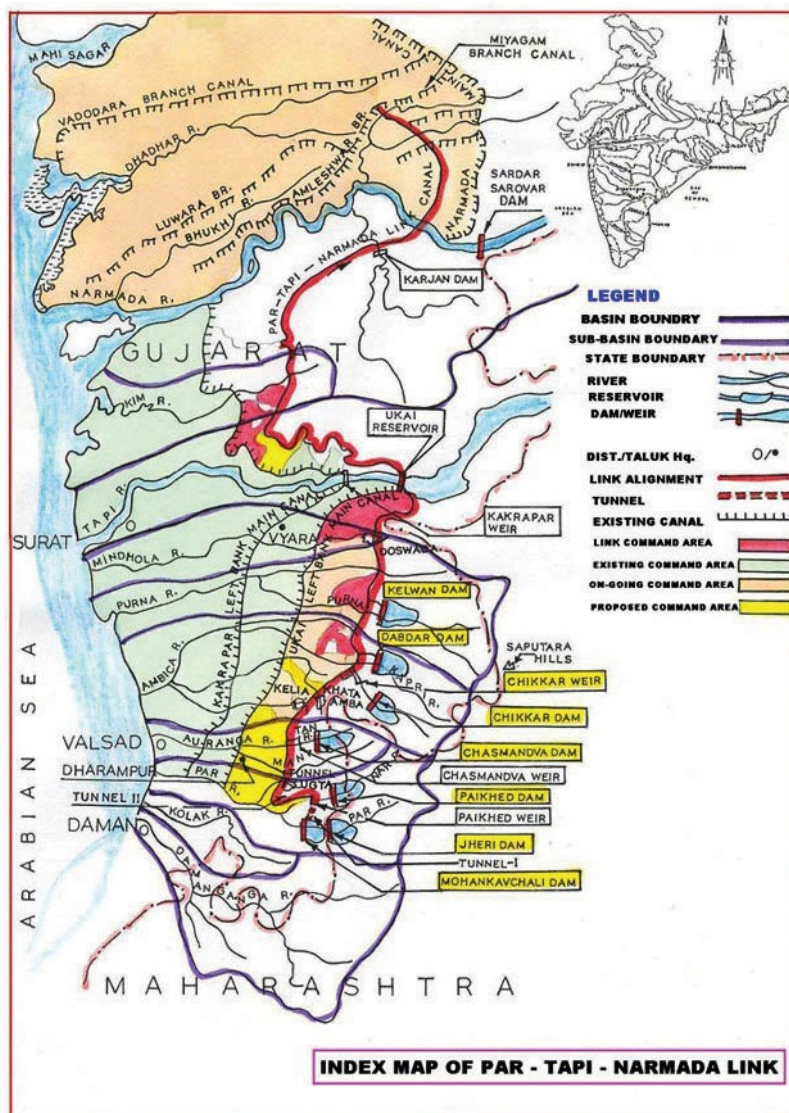
LATEST PROJECT COST: RS 103BN

The surplus water proposed for diversion through Par-Tapi-Narmada link project will provide irrigation to a total area of 232,175 ha., of which 61,190 ha. is en-route the link canal:

- 10,100 ha. is en-route command in the reach between Par and Tapi
- 49,820 ha. en-route command in the reach between Tapi and Narmada
- 630 ha. en-route command under Dabdar feeder pipelines
- 640 ha. en-route command under Kelwan feeder pipelines

The command area of five projects proposed by the government of Gujarat on the left side of the canal is about 45,561 ha. to be irrigated by gravity through a link canal. The tribal area on the right side of the canal is 36,200 ha., which will be irrigated by lift. About 12,514 ha. of tribal area will also be irrigated directly by lift from the proposed six reservoirs. Narmada water, so saved, will be used to provide irrigation facilities in the tribal area on the right side of Narmada main canal to the extent of 23,750 ha. in the Chhota Udepur district and 10,592 ha. in the Panchmahal district (through lift on substitution basis), and 42,368 ha. in Saurashtra, Gujarat. A provision of about 76 MCM of water is allocated to meet drinking-water supply to 2.76mn population in the above areas. Also, a provision of 50 MCM is made for filling of 2,226 panchayat and village tanks/check dams in the benefitted areas. The project will also generate about 102 MU of hydropower from the powerhouses proposed at various dams and the canal fall, besides providing drinking water to the villages in the region.

The total utilisation through Par-Tapi-Narmada link from six dams will be 1,330 MCM. However, at a later stage, when the public hindrance is resolved and the required field survey and investigations are carried out, the proposed Mohankavchali dam will also be dovetailed with the Par-Tapi-Narmada link project.



Project Cost & Financial Viability (as per DPR, 2014-15 prices)

Project (Rs mn)	Ken Betwa - I
Total Project Cost - Breakup	
Head Works	47,477
Canals and Conveyance system	43,449
Power Installations	1,809
Command Area Development	55
Total	92,790
Financial Viability	
Net return from agricultural produce	10,736
Rev from Power sale	612
Rev from Water Supply	710
Others	30
Total revenue	12,088
Annual Cost (depcn, interst etc)	10,761
IRR	10.43%

Source: CWC

"Major Dams in India"



NAGARJUNASAGAR

❖ Location	Gutur (AP) & Nalgonda (Telangana)
❖ River	Krishna River
❖ Construction started	1955
❖ Opening date	1967
❖ Height (ft)	407
❖ Length (ft)	5,085
❖ Reservoir Capacity (MAF)	9.1
❖ Surface area (km2)	285
❖ Installed capacity (MW)	816



BHAKRA NANGAL

❖ Location	Bilaspur (HP)
❖ River	Satluj River
❖ Construction started	1948
❖ Opening date	1963
❖ Height (ft)	741
❖ Length (ft)	1,700
❖ Reservoir Capacity (MAF)	7.6
❖ Surface area (km2)	168
❖ Installed capacity (MW)	1,325

HIRAKUD

❖ Location	Sambalpur (Odisha)
❖ River	Mahanadi River
❖ Construction started	1948
❖ Opening date	1957
❖ Height (ft)	200
❖ Length (ft)	15,748
❖ Reservoir Capacity (MAF)	4.8
❖ Surface area (km2)	NA
❖ Installed capacity (MW)	350



TEHRI

❖ Location	Uttarakhand
❖ River	Bhagirathi River
❖ Construction started	1978
❖ Opening date	2006
❖ Height (ft)	855
❖ Length (ft)	1,886
❖ Reservoir Capacity (MAF)	3.2
❖ Surface area (km2)	52
❖ Installed capacity (MW)	1,000



TUNGABHADRA

❖ Location	Hospet (Karnataka)
❖ River	Tungabhadra River
❖ Construction started	1949
❖ Opening date	1953
❖ Height (ft)	162
❖ Length (ft)	8,035
❖ Reservoir Capacity (MAF)	2.3
❖ Surface area (km2)	350
❖ Installed capacity (MW)	127

Damanganga-Pinjal Link

Objective and need for the project

The objective of the Damanganga project is to divert surplus water of the Damanganga river at Bhugad and Khargihill reservoir to the Pinjal reservoir in Vaitarna basin (proposed by the government of Maharashtra) for Mumbai city, in order to augment the city's domestic water supply.

With the present pace of development of Greater Mumbai, it is anticipated that there would be acute shortage of domestic water in the year 2050. As per the assessment of the Municipal Corporation of Greater Mumbai (MCGM), the current (2012) shortage of water supply of 854 MLD (Million litres per day) will increase to 1700 MLD in 2041 and 2020 MLD by 2060.

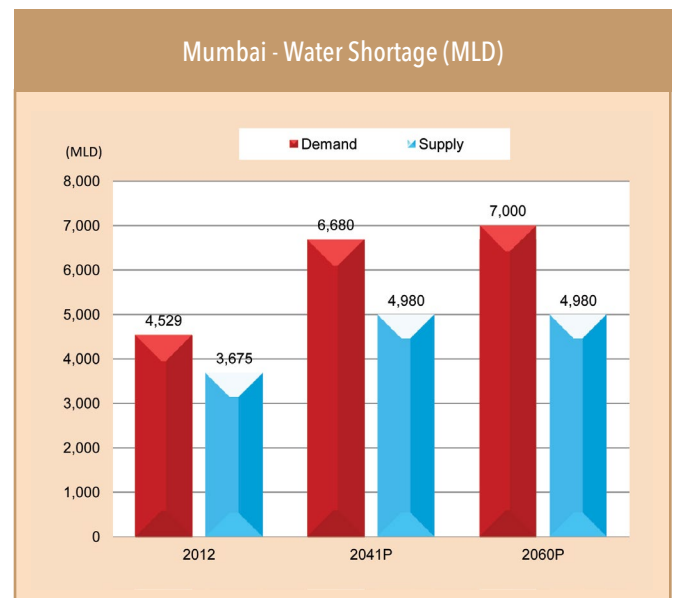
Development timeline

The feasibility report of the Damanganga-Pinjal Link Project was prepared by the NWDA in November 2004 and circulated to all concerned State Governments and members of Technical Advisory Committee (TAC) of NWDA. After consensus was arrived amongst the Central Government and concerned States of Gujarat and Maharashtra, a tripartite Memorandum of Understanding (MoU) was signed by the states and the Union Government on 3rd May, 2010 at New Delhi for preparation of the DPR.

Subsequently, the NWDA took-up various surveys, studies and investigation works with the help of expert agencies to complete and submit the DPR in March, 2014. Thereafter, various obstacles related to project execution have been cleared. The Union Minister for Water Resources also held meeting with the Maharashtra CM at Mumbai on 3rd May, 2016 where in Damanganga-Pinjal and Par-Tapi-Narmada Link Projects were discussed among other issues

The project requires 'Tehcno Economic Clearance' from the CWC, and the 'resettlement and

rehabilitation of population' clearance from the Ministry of Tribal Welfare. The Ministry of Environment & Forest (MOEF) indicated in a letter in 2008 that the project does not come under the provision of EIA Notifications, 2006, as it is a drinking-water-supply project and hence such environmental clearance is not required.



Source: MCGM

Constitution of the project

For this project, the following have been proposed:

- **Bhugad dam** is proposed across river Damanganga near village Bhugad in Trimbak taluka of Nasik district of Maharashtra. The surplus water available at Bhugad reservoir is to be transferred to the proposed Khargihill reservoir through a tunnel, which will takeoff from the left flank of the Bhugad reservoir upstream of Bhugad dam.
- **Khargihill dam** is proposed across river Vagh, a tributary of river Damanganga near village Behadpada in Jawhar taluka of Thane district

Project Cost & Financial Viability (as per DPR, 2012-13 prices)

Project (Rs mn)	Ken Betwa - I
Total Project Cost - Breakup	
Head Works	27,113
Canals and Conveyance system	0
Power Installations	353
Total	27,466
Financial Viability	
Net return from agricultural produce	0
Rev from Power sale	69
Rev from Water Supply	7,253
Others	0
Total revenue	7,322
Annual Cost (depcn, interst etc)	3,762
IRR	16.29%

Source: CWC

LATEST PROJECT COST: RS 30BN

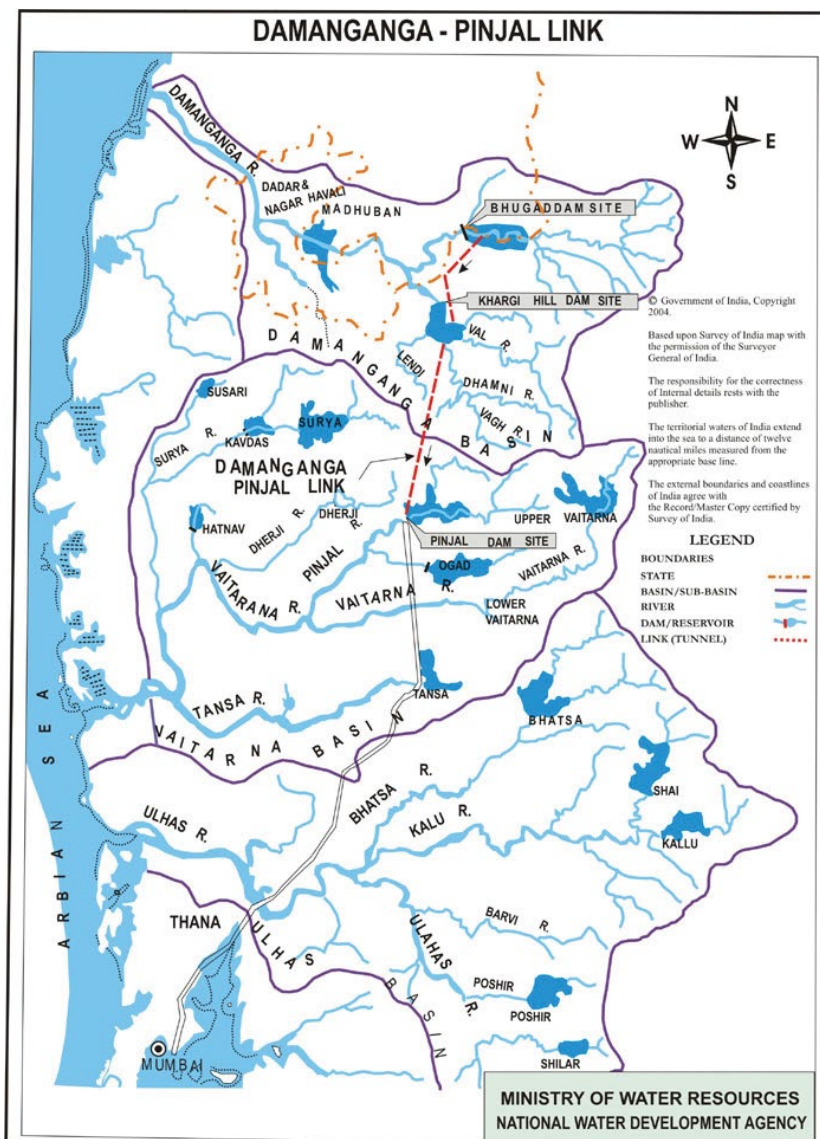
of Maharashtra. A saddle dam is proposed on the left flank of the Khargihill reservoir near village Vavar. The combined surplus water available at Khargihill reservoir is to be transferred to the proposed Pinjal reservoir through a tunnel. The tunnel will off take from the left flank of the Khargihill reservoir upstream of Khargihill dam.

- **Pinjal dam** is proposed across river Pinjal, a tributary of Vaitarna river near village Khidse in Wada taluka of Thane district of Maharashtra. A saddle dam is also proposed.

In addition, two tunnels are proposed:

- Connecting Bhugad reservoir with Khargihill reservoir
- Connecting Khargihill reservoir with Pinjal reservoir

The surplus water available at the proposed Pinjal reservoir, along with the water to be transferred from proposed Bhugad and Khargihill reservoirs of the Damanganga basin, is to be taken up to Mumbai city through a suitable conveyance system as per the planning of the Municipal



Corporation of Greater Mumbai (MCBM) and Mumbai Metropolitan Region Development Authority (MMRDA).

The powerhouses at the toe of both Bhugad and Khargihill dams are also likely to generate hydropower by using water proposed to be released to meet the water requirements downstream of the respective dam sites.

SARDAR SAROVAR DAM

– A Classic Case Study

While the NRLP might offer tremendous value proposition, it will be puerile to underestimate its challenges. To understand the execution challenges in the constructing of over 100 dams and 15,000km of canals, one doesn't need to go far – the challenges faced and the execution timeline of the Sardar Sarovar dam in Gujarat is a good example of how difficult things can get. The project, which has been the subject of much controversy for decades, is said to be one of the largest dams in the world. At a length of 1.2km and a height of 138m, the benefits of this dam will be shared by MP, Maharashtra, and Gujarat.

The Sardar Sarovar project was the vision of India's first deputy prime minister – Sardar Vallabhbhai Patel. The foundation stone of the project was laid by Jawaharlal Nehru (India's first prime minister) on April 5, 1961 – after a detailed study was carried out on the usage of the Narmada river water flowing through the states of MP and Gujarat, and into the Arabian Sea. The DPR prepared led to many disputes over the distribution of water among three states – Gujarat, Maharashtra and MP. Consequently, a Narmada Water Dispute Tribunal (NWDT) was created in 1969, to resolve the water sharing disputes.

After studying multiple reports and negotiations, the NWDT in 1979 proposed that out of the 35BCM of water available from the dam, MP would receive 65%, Gujarat 32%, and Rajasthan and Maharashtra the remaining 3%. The Planning Commission approved the project in 1988.



As the project was being planned, it caught the attention of social activists who were not happy with the environmental and social damages caused by the dam. Leading the protests was Medha Patkar, who visited the site of the dam in 1985, and started a movement against the project called the Narmada Bachao Andolan that went on to acquire international attention.

At that time, the project was funded by World Bank, which had granted a loan of US\$ 300mn. However, the constant agitations forced the World Bank to set up a committee to review the project. It concluded that the assessments made for the project by the Indian government were inadequate, and eventually the loan was cancelled on March 31, 1993.

However, after several years of deliberation the Supreme Court allowed the construction of the dam to proceed, provided it met with certain conditions (primarily related to rehabilitation of displaced people) for every 5m increase in the height of the dam.

Eventually, 56 years after its foundation stone was laid, the dam was inaugurated by the current PM Narendra Modi (on September 17, 2017). The dam has a height of 139 metres and usable storage of 7.7 (MAF) of water. The project will irrigate more than 18,000 sq. km (6,900 sq. miles), most of it in drought-prone areas of Kutch and Saurashtra, and generate 1,450MW of hydropower.





SARDAR SAORVAR DAM

❖ Location	Navagam (Gujarat)
❖ River	Narmada
❖ Construction started	1961
❖ Opening date	2017
❖ Construction cost	Rs 600BN
❖ Height (ft)	535
❖ Length (ft)	3,970
❖ Reservoir Capacity (MAF)	7.7
❖ Catchment area (km ²)	88,000
❖ Installed capacity (MW)	1,450

Sardar Sarovar dam was constructed for Rs 600bn and led to displacement of 70,000 people. The NRLP is expected to cost Rs 11trn, and will lead to displacement of much higher number of people. If the SSD took 56 years after its foundation stone was laid – one can imagine the timeline for the execution of the entire NRLP. However, the experience of having dealt with protests and rehabilitation issues in SSD, should hopefully help pre-empt issues and prevent too many delays.

Sardar Sarovar Dam - The Timeline

1946	Plan for harnessing the river for irrigation and power generation in Narmada basin
Apr '61	Foundation stone laid by Jawaharlal Nehru
1964	Gol forms a committee (under late Dr Khosla) to resolve water sharing dispute between Gujarat and MP
1965	Khosla committee recommends dam height of 500ft (152.44m), for which MP government does not agree
1969	Narmada Water Dispute Tribunal (NWDt) created by Gol, to decide the fate of the project
1979	NWDt gives its verdict for the 35bn cubic metre water to be shared between MP (65%), Gujarat (32%) and Rajasthan & Maharashtra (3%)
1988	Planning Commission approves the project
1989	Medha Patkar starts Narmada Bachao Andolan, citing environment and social conditions violation
1993	Government cancels loan authorized by the World Bank, citing inadequate assessment in sanctioning project
1999 to 2017	Through various Supreme court decisions, and Narmada Control Authority (NCA), the height of dam was raised from 80m (260ft) to 138.68m (455 ft).
Sep '17	Sardar Sarovar Dam inaugurated by Narendra Modi

Benefits of the Sardar Sarovar Dam

- Gujarat: 17,920 km²; spread over 12 districts, 62 talukas and 3,393 villages (75% of which is drought prone)
- Rajasthan: 730 km²; in the arid areas of Barmer and Jalore districts
- The dam will provide flood protection to riverine reaches measuring 30,000 ha (74,000 acres) covering 210 villages and Bharuch city and a population of 400,000 in Gujarat.

The project has the potential to feed as many as 20 million people, provide domestic and industrial water for about 30 million, employ about 1 million, and provide valuable peak electric power in an area with high unmet power demand (farm pumps often get only a few hours of power per day). It will also provide flood protection to riverine reaches measuring 30,000 ha. covering 210 villages and Bharuch city and a population of 0.4mn in Gujarat. In addition, recent research shows substantial economic multiplier effects (investment and employment triggered by development) from irrigation development. Set against the future of about 70,000 project affected people, even without the multiplier effect, the ratio of beneficiaries to affected persons is well over 100:1

The benefits of the dam as listed in the Judgement of the Supreme Court of India in 2000:

The argument in favour of the Sardar Sarovar Project is that the benefits are so large that they substantially outweigh the costs of the immediate human and environmental disruption. Without the dam, the long term costs for people would be much greater and lack of an income source for future generations would put increasing pressure on the environment. If the water of the Narmada river continues to flow to the sea unused, there appears to be no alternative to escalating human deprivation, particularly in the dry areas of Gujarat.

Project cost and funding

The NRLP is still in a nascent stage. DPRs of most links are yet to be finalised and submitted. However, since the feasibility reports for most links are ready, the CWC can come up with a rough estimate of the total cost involved in executing a project. As per the CWC, the total cost of the 30 links was estimated to be Rs 5.6trillion in 2002-03 prices – or Rs 11.4trillion in 2015 prices. An investment of this magnitude has to be considered from the perspective of direct and indirect benefits to be accrued over the execution period and beyond.

NRLP total project cost estimate (2002-03 prices)

Component	Cost (Rs trillion)
Peninsular Component	1.9
Himalayan Component	3.8
Total Original Cost	5.6
New Estimated Cost (2015 prices)	11.4

Source: CWC

Apart from the direct benefits – (1) providing relief from recurring floods/droughts, (2) adding 35mn ha. to the irrigated land in the country, and (3) adding about 30GW of hydro power capacity – the project is expected to have significant indirect benefits. Likely to be executed over the next 10-15 years, this project alone could be the biggest boost to construction, cement, and iron/steel industries – in addition to the employment opportunities it will generate over its execution period.

An investment of Rs 11.4trillion appears to be MASSIVE. But broken down into parts and by funding sources, the task appears achievable

- First, the project will probably be executed over the next 10 years (best-case), which translates into an annual investment of Rs 1trillion – a figure that appears more attainable.

- Second, irrigation is a state subject – so majority of the expenditure for this project would be borne by beneficiary states. A look at the irrigation expenditure and the FY18 outlay of India's states (from the state budgetary documents) reveals that the top-15 states in India spent Rs 790bn in FY17 on irrigation and are planning to spend Rs 980bn in FY18. If these states are already spending about a trillion rupees on irrigation, it is plausible to expect them to continue doing so over the next 10 years – that too on a project with bigger direct/indirect benefits.
- Third, the centre is expected to provide additional financial support for executing this project to participating states. It might also seek funding from foreign sources such as the World Bank or the ADB, which are open to funding development projects like these.

States' Annual Irrigation Layout (Top-15)

States (Rs bn)	FY14	FY15	FY16	FY17	FY18BE*
AP	31.0	42.9	45.8	74.4	120.6
Bihar	18.0	16.5	19.4	16.9	31.0
Chhattisgarh	16.8	15.4	23.4	22.0	25.7
Gujarat	67.8	76.5	83.1	80.7	94.0
Haryana	9.1	9.7	5.4	6.1	8.3
Karnataka	63.8	77.8	74.0	90.0	133.0
MP	45.4	41.3	64.8	83.0	94.0
Maharashtra	78.8	70.1	85.8	84.5	55.5
Orissa	22.1	28.5	40.6	57.0	70.5
Punjab	3.6	6.6	7.5	15.8	8.7
Rajasthan	10.8	12.7	13.9	20.2	24.0
Tamil Nadu	9.7	12.4	10.8	15.0	29.0
Telangana			95.4	145.6	226.7
Uttar Pradesh	29.6	40.9	58.1	66.1	40.9
West Bengal	7.2	13.7	21.8	13.7	22.0
Total	413.8	464.9	649.8	791.0	983.9

Source: State Budgetary Document (*BE = Budgetary Estimates)

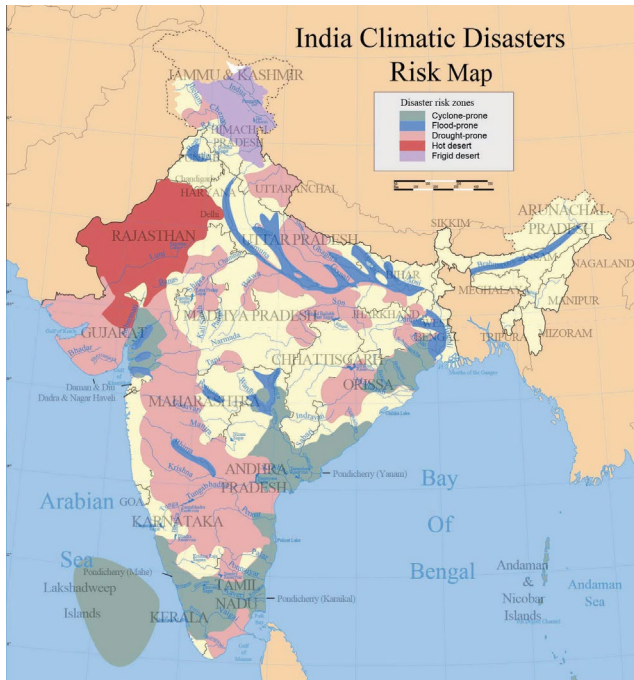
CONCLUSION

The NRLP is a highly ambitious project, but with its heart in the right place. The project aims to assuage the recurring problem of floods and droughts in India, while adding significant irrigable land and hydropower capacity in the process. The project has been floating around various departments over five decades, but for the first time, the Indian government is taking concrete steps to ensure its execution.

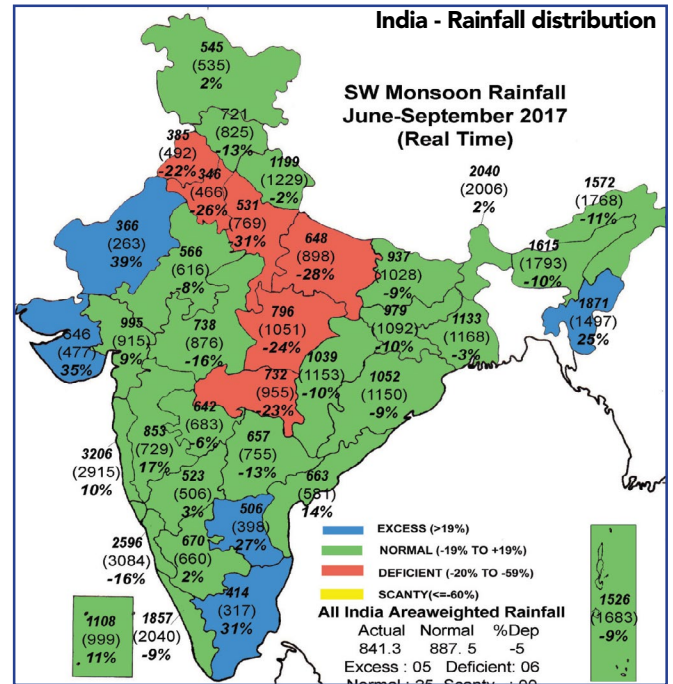
With a capital outlay of Rs 11 trillion over the next decade, the NRLP can provide a huge boost to the construction sector. This enormous opportunity could potentially lead to the birth of new construction companies – à la the irrigation boom in Andhra Pradesh in the late 1990s, which triggered the rise of many Hyderabad-based construction companies (some of whom have survived, and become big diversified players). Simultaneously, it will generate an unprecedented demand for cement and iron/steel, and generate enormous temporary (over 10 years) and permanent employment.

While the benefits are immense, the challenges are daunting too. The project requires massive political will and financial capital. The latter might not be an insurmountable problem, given the huge irrigation budget of various states and the new sources of foreign funding that have recently started favouring big-ticket infrastructure projects in India. However, building political consensus remains arduous. The government is taking the right steps by approaching the project in a piecemeal manner – plucking low-hanging fruit (projects in states that have NDA in power). The hope is that the currently reluctant state governments, after seeing the positive results of execution in other states, will eventually come on board. After all, there is only one thing that can persuade political parties to execute welfare projects in India – not the prospect of development of its people, but an assurance of their votes. This project, directly benefiting the highly electorally important rural population, certainly provides that assurance.

Appendix: India - A Unique Topography



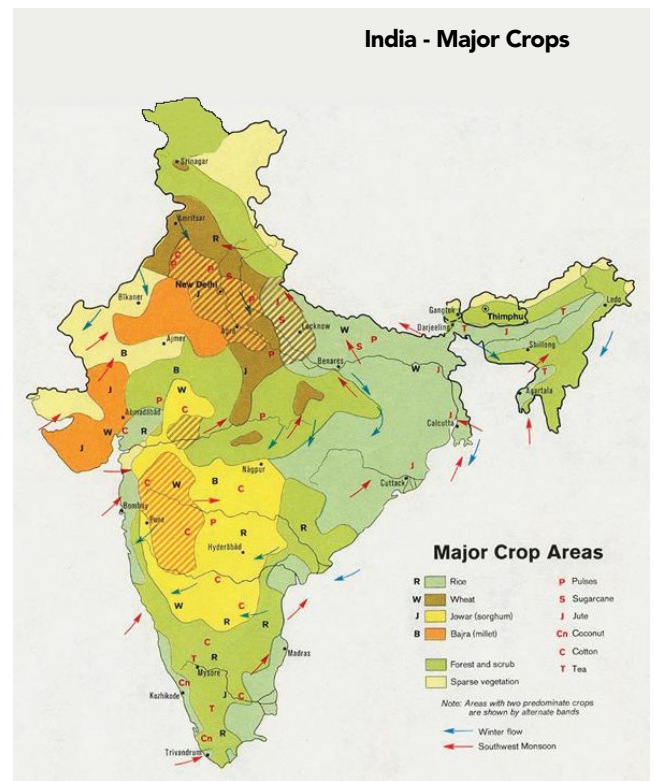
Source: CoEDMM, IIT-Roorkee



Source: India Meteorological Dept



Source: CWC



Source: MOSPI

Hon'ble Shri Nitin Gadkari

Union Minister for Road Transport & Highways, Shipping, Water Resources, River Development and Ganga Rejuvenation



Seldom has a politician been admired by the public, opposition and media alike, as the current Union Minister for Road Transport and Highways, Shipping and Water Resources, River Development

& Ganga Rejuvenation – Shri Nitin Gadkari. He is a known visionary and an able executioner.

Ever since he has taken charge of the Ministry of Roads and Shipping, the sectors have seen unprecedented activity. The mega projects under his supervision – Bharatmala, Sagarmala, Water transport, National River Linking Project and Ganga Rejuvenation – promise to transform the infrastructure of this country like never before. We remain grateful to his ministry for letting us host him for an exclusive interactive session, with the premier investors (public and private) of the country on 2nd November 2017. Some excerpts from the enlightening discussion:



Q: So we have heard about the mega programme – Bharatmala Paryojna – which envisages construction of 35,000km with capex of Rs 5.35 trillion, over the next five years. The question everyone wants to be answered is what is the source of funding for the same.

A: Bharatmala Paryojna is a project for developing 65,000km of corridors, highways, and expressways. Out of this, the development of 34,800km will be taken up in Phase-1 at an investment of Rs 5.35trillion. The development of DPRs for 25,000km is being taken up now. We will complete Phase-1 by 2022, and should wrap up awarding of projects before 2019. Phase-2 will entail 30,600km of road upgradation.

We will take up work on expressways and economic corridors first. We plan to have around 50 economic corridors with a total length of 9,000km. In Bharatmala, we will have 45 bypasses and 28 ring-roads. For the first time, for timely work completion, we will use pre-cast sections to construct over 1000 bridges. Under Bharatmala, project stretches have been identified through detailed origin-and-destination studies, freight-flow projections, and geo-mapping. The Bhaskaracharya Institute for Space Applications and Geo-Informatics helped us to identify these stretches.

Bharatmala's funding will not be a problem, because we have multiple sources:

- NHAI earns an annual toll income of about Rs 100bn.
- NHAI is rated AAA – and can raise money through NHAI bonds, which it does every year.
- We plan to tap the capital markets to raise ~Rs 700bn.
- We plan to monetize 104 road projects for about Rs 1.25trillion – and the first tranche of 10 projects (Rs 65bn) is likely to be monetized soon.
- Our annual budgetary support has been about Rs 650-700bn, with an increase of 10-20% every year – and this should continue. However, I plan to ask the Ministry of Finance for higher allocation.
- Lastly, we intend to deploy models such as BOT and HAM in order to lower NHAI's capital requirement.

Our capital markets have a very high appetite for infrastructure players. We recently came out with Cochin Shipyard's public issue. We were asking only for Rs 15bn, but the IPO was subscribed 76 times – the market was ready to give us Rs 1.26trillion! NHAI is three to four times more financially stronger than Cochin shipyard – so I believe there should be good demand for NHAI too.

Besides, I want the common people to participate and benefit from the infrastructure development of our country. We plan to offer NHAI bonds, which will provide the holders

Overall, my department has a target to spend Rs 25trillion over the next five years – in roads, shipping, and water resources. This will create over 10mn jobs and contribute 2-3% to the GDP of the country.

with 7.25-7.50% interest – which is more than the current fixed-deposit rate – with a higher rate for senior citizens. By subscribing to these bonds, the common people of this country will earn more on their savings and get a chance to participate in the development of infrastructure of the country.

The problem with the current situation is that our interest rates are very high – too high to make projects feasible. IRR expectations from various projects are also elevated. Hence, we are looking at various overseas financing options where we can fund the projects at a much lower cost (than what the current banking system provides).

Q: Land acquisition has been one of the major problems for the road sector. Even today, various projects are stuck because of this. Do you foresee this becoming a problem while executing Bharatmala – and how do you intend to overcome it?

A: I don't agree that land acquisition is still a problem.

Over the last three years, we have done a lot to improve processes – especially in land acquisition. In 2014 (when the NDA government came into power), over 100 projects were stuck due to various reasons – by simplifying the process and with steps such as premium rescheduling, equity infusion, and retendering projects, we have revived all these stuck projects. In fact, we have tried to get faster land clearances for projects that were stuck due to land acquisition.

As of today, we have a policy of not awarding any project unless we have acquired 80% land for the project. With this policy, you can see how land acquisition will not be a problem. The compensation that we give for acquiring land is also very high. You won't believe this, but these days, people are coming to our department and asking us to acquire their land for our projects.

In fact, at this very moment, we have Rs 20bn deposited with the Maharashtra state government and Rs 8bn with the Uttar Pradesh government for land acquisition. There could be few exceptional cases where problems crop up – but otherwise,



land acquisition is not a problem anymore.

Q: You have placed a lot of emphasis on electric vehicles and electrification of public transport. Do you think that technology is advanced enough for this to be commercially viable?

A: If you take the example of your city – Mumbai. Here, the cost of running BEST (Brihanmumbai Electric Supply and Transport) buses is Rs 110 per km. Compared to this, an electric bus will cost Rs 65 per km. In Nagpur, we are running buses on ethanol and they cost us only Rs 70 per km. Electric-vehicle technology has already reached a stage where it can be put into commercial use, especially for public transport.

It is very simple really – electric vehicles offer you an alternative that is indigenous, cost effective, environment friendly, and an import substitute. By using these vehicles, we provide a boost to local manufacturing, reducing operating costs, reducing pollution, and reducing our dependency on oil imports. The benefits are manifold.

In Nagpur, we already have 200 e-taxis running through the city and we have also built over 80 charging stations. For electric vehicles, charging stations are very important. We are talking with IOC, HPCL, etc., – to open charging stations at their petrol pumps. Small vehicles such as two-wheelers, one can even charge them at home. For larger vehicles and longer travel, you need regular charging stations.

We are trying to promote e-rickshaws and e-buses in a big way. We already have over 150,000 e-rickshaws running in

the country. We are also looking for funding from foreign banks, to procure e-buses.

Q: What kind of incentive are we providing to promote production of indigenous electric vehicles?

A: I think the incentives are already there in the system. There is 12% GST on electric/hybrid vehicles – which is one of the lowest. The power tariffs are at an all-time low – as low as Rs 2.5/unit. I think those are enough incentives and any more are not required.

Q: Are you considering a regulator for the road sector – so that investors, especially foreign investors become more confident about investing in the sector?

A: No, I will not allow any regulator in any of my departments. I do not want a body that does not have even 1% stake in anything to make decisions for my sector. I want decisions to be taken fast, and I do not believe that a regulator will help that cause. We have already seen what

For me, the argument is very simple – electric vehicles offer you an alternative that is indigenous, cost effective, environment friendly, and import substitute.





regulators have done in other sectors such as power and airports. For my departments, we have arbitration procedures in place. We have also made 75% payments mandatory if a developer wins the arbitration. After all this, I don't believe there is a need for a regulator – not in my departments.

Q: As a minister for transport, you have emphasised improving the environment and safety of Indian roads by scrapping old vehicles. Can you take us through what is being done on that front?

A: Road accidents is a very big problem in India. Every year, there are 500,000 accidents and 150,000 deaths due to road accidents. We need to reduce this. Additionally, 68% of all vehicular pollution is caused by commercial vehicles that are more than 15 years old. This is why we are formulating a transport policy that deals with the scrapping of old vehicles. We have proposed that owners who offer their vehicles for scrapping will receive a 'scrap certificate', which they can use to part-finance their new vehicles. So for example, if you bought a truck for Rs 15 lakhs (Rs 1.5mn), and 12 years later you offer it for scrap, you will receive a certificate of let's say Rs 2-3 lakhs (Rs 200,000-300,000). You can use this certificate to waive off that amount from your new truck purchase.

The policy is with the finance ministry for the last 4-5 months, primarily as they are assessing the GST angle. But I am sure we will be able to implement this policy very soon – which will lead to reduction of pollution and road accidents across the country.

Q: Inland water transport is one area that has seen much action under your tenure. Why are we focussing so much on water transport when the condition of roads and railways itself need improvement?

A: Auto sales in India are growing at the rate of 22% every year. This is clearly not sustainable. Any amount of roads we build or upgrade will not be sufficient to provide for this kind of growth. Hence, we have to provide a better and more economical substitute for road transport.

To give you an example, road transport costs Rs 2.58 per-tonne per-km as compared to Rs 1.4 for railways and only Rs 1.06 for waterways. Clearly, water transport is much more cost effective and efficient than roads and railways. It is also environment friendly and reduces the load on our railways and highways network. In India, logistics costs are as high as 18% of total costs as compared to 12% in Europe and only 8% in China. If we were to move our entire logistics to waterways (which I know is not possible), our costs will fall to 6%. As a transport minister, I am sorry to say this to investors in the roads sector – but my priority is first waterways, then railways, and lastly – roads.

We are actively working towards this goal. India has 111 rivers and 20,000km of waterways. We are planning to convert a large part of these into navigable waterways. Already, work on the 1,080km Allahabad to Haldia waterway is going on. Simultaneously, waterways are sanctioned in Goa, Mumbai, on the Brahmaputra River, and many more across the country. By December (2017), we intend to start work on 10 inland waterways. Just yesterday, we moved



240,000 tonnes of steel from Vizag to Allahabad through inland waterways.

Q: There is another ministry that you have recently been given charge of – water resources. We understand there are mega projects like Rivers Inter-linking and Ganga Rejuvenation under this ministry. What can we expect now that you are at the helm?

A: You see, that's the thing! I went to the PM to tell him about some problems that my (road transport) departments were facing and he gave me this additional duty (chuckles). But on a serious note, we are executing things in this segment as well. For example, in rivers inter-linking projects, we will be awarding work on three projects – one in MP and two others in Maharashtra, worth Rs 1 trillion, in the next few months. On other links, too, work is progressing. The farmers of this country will benefit immensely from this project (floods and droughts will reduce). My target is to double the current irrigated land in the country, by 2022.

On the Ganga River front, the earlier minister has also done a commendable job – out of the 97 projects planned, 90 have been awarded. We are planning to retender 55 old projects and award 300 projects to purify the river water.

Q: You have placed a lot of emphasis on electronic tolling, which saves time and fuel, apart from reducing pollution. What is the progress on that?

A: From 1st December 2017, all new commercial vehicles are mandated to have a pre-fixed ETC tag. There are around 8-9 technologies that we are considering for reading the cards and automatically weighing the commercial vehicles, so that the time at the toll plazas is drastically lowered. We have already tagged over 1.7mn old vehicles with ETC tags, and the process is going on. We are also in the process of tying

up with various banks to implement this. All these systems should be in place by March 2018.

Q: Sir we have had a wonderful discussion, where you have given a great perspective on the mammoth changes we can expect in the infrastructure of this country. As the last question, on a personal note, if I can ask – how do you manage multiple things so efficiently while maintaining a balance between work and family?

A: [Laughs] I am a simple farmer from Maharashtra. Many people think that I am a technology person, or have knowledge about infrastructure and all. But I am a simple commerce graduate, and my passion is farming. But we all are working, day and night, because we want to work for the country - as we have been given this opportunity by the people of this country.

I believe in making quick and fast decisions. I believe that you either take decisions, or you can go for surveys, committees, and meetings. It is not that we do not do surveys or research for our projects – for example, the entire Bharatmala project has been planned on the basis of extensive research. However, decision-making has to be very fast – I try to do this, and believe that this approach works best.

I believe in making quick and fast decisions. I believe that you either take decisions, or you can go for surveys, committees, and meetings.

So, I am also the head of a government committee that has the responsibility to resolve any inter-ministerial disputes. If there is any trouble between two ministries, they are 'supposed' to come to me for a resolution. However, because of my reputation for taking quick decisions, they end up resolving disputes on their own and usually tell me that there is no problem [laughs].

So fast decision making is the key here, and that is all I try to do. I am not highly educated, and don't have much technical knowledge about roads or infrastructure. But I have the desire to do something good for the country, and that is what drives me and helps me to maintain a balance.

Indian Economy – Trend Indicators

Monthly Economic Indicators

Growth Rates (%)	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
IIP	4.9	5.7	4.9	5.7	2.6	3.8	1.9	3.8	3.2	2.8	-0.2	0.9	4.3	
PMI	52.6	52.1	54.4	52.3	49.6	50.4	50.7	52.5	52.5	51.6	50.9	47.9	51.2	51.2
Core sector	3.1	5.3	7.1	3.2	5.6	3.4	0.6	5.3	2.8	4.1	0.8	2.6	4.9	
WPI	1.1	1.4	1.3	1.8	2.1	4.3	5.5	5.1	3.9	2.1	0.9	1.9	3.2	2.6
CPI	5.0	4.4	4.2	3.6	3.4	3.2	3.7	3.8	3.0	2.2	2.4	3.3	3.3	-0.6
Money Supply	10.3	12.1	10.9	8.5	6.2	6.4	6.5	7.3	6.2	7.0	7.4	7.1	7	6
Deposit	9.2	11.3	9.8	15.3	14.5	13.2	12.1	11.2	9.7	10.3	10.5	9.8	9.7	8.1
Credit	9.6	11.2	8.8	4.7	4.7	4.6	4.4	4.7	3.9	4.7	5.6	5.79	5.89	6.5
Exports	-0.3	4.6	9.6	2.3	5.7	4.3	17.5	27.6	19.8	8.3	4.4	3.9	10.3	25.7
Imports	-14.1	-2.5	8.1	10.4	0.5	10.7	21.8	45.3	49.1	33.1	19.0	15.4	21.0	18.1
Trade deficit (USD Bn)	-7.7	-8.3	-10.2	-13.0	-10.4	-9.8	-8.9	-10.4	-13.2	-13.8	-13.0	-11.4	-11.6	-9.0
Net FDI (USD Bn)	4.4	4.6	2.4	4.5	2.7	3.8	1.1	0.6	1.8	3.8	1.6	4.0	8.6	
FII (USD Bn)	1.0	3.0	-1.8	-5.5	-4.0	-0.4	2.5	9.0	2.7	4.7	4.7	4.6	3.3	0.6
ECB (USD Bn)	3.2	2.5	1.8	0.5	2.8	1.8	2.2	3.3	1.7	1.1	1.6	1.9	1.6	
Dollar-Rupee	67.0	66.6	66.8	68.4	67.9	67.9	66.7	64.9	64.2	64.5	64.6	64.2	63.9	65.3
FOREX Reserves (USD Bn)	366.8	372.0	367.2	365.3	360.3	361.6	362.8	370.0	372.7	378.8	386.5	392.9	394.6	399.7
NRI Deposits (USD Bn)	130.1	130.0	124.4	113.1	109.8	110.1	111.6	116.9	117.2	117.5	118.1	119.2	118.5	

Quarterly Economic Indicators

Balance of Payment (USD Bn)	Q1FY16	Q2FY16	Q3FY16	Q4FY16	Q1FY17	Q2FY17	Q3FY17	Q4FY17	Q1FY18
Exports	68.0	67.6	64.9	65.8	66.6	67.4	68.8	77.4	73.7
Imports	102.2	104.7	98.9	90.6	90.5	93.1	102.0	107.1	114.9
Trade deficit	-34.2	-37.2	-34.0	-24.8	-23.8	-25.6	-33.3	-29.7	-41.2
Net Invisibles	28.0	28.6	26.9	24.4	23.4	22.2	25.3	26.3	26.9
CAD	-6.1	-8.6	-7.1	-0.3	-0.4	-3.4	-8.0	-3.5	-14.3
CAD (% of GDP)	1.2	1.7	1.3	0.1	0.0	0.0	1.4	0.6	2.4
Capital Account	18.6	8.1	10.9	3.5	7.2	12.8	6.1	10.4	25.4
BoP	11.4	-0.9	4.1	3.3	7.0	8.5	-1.2	7.3	11.4

GDP and its Components (YoY, %)	Q1FY16	Q2FY16	Q3FY16	Q4FY16	Q1FY17	Q2FY17	Q3FY17	Q4FY17	Q1FY18
Agriculture & allied activities	2.6	2.3	-2.1	1.5	2.5	4.1	6.9	5.2	2.3
Industry	7.1	9.2	12.0	11.9	9.0	6.5	7.2	5.5	1.5
Mining & Quarrying	11.2	12.2	11.7	10.5	-0.9	-1.3	1.9	6.4	-0.7
Manufacturing	8.5	9.3	13.2	12.7	10.7	7.7	8.2	5.3	1.2
Electricity, Gas & Water Supply	2.5	5.7	4.0	7.6	10.3	5.1	7.4	6.1	7.0
Services	8.3	9.0	9.0	9.4	8.2	7.4	6.4	5.7	7.8
Construction	4.8	1.6	6.0	6.0	3.1	4.3	3.4	-3.7	2.0
Trade, Hotel, Transport and Communications	10.6	8.3	10.1	12.8	8.9	7.7	8.3	6.5	11.1
Finance, Insurance, Real Estate & Business Services	10.2	13.0	10.5	9.0	9.4	7.0	3.3	2.2	6.4
Community, Social & Personal Services	6.3	7.2	7.5	6.7	8.6	9.5	10.3	17.0	9.5
GDP at FC	7.8	8.2	7.3	8.7	7.6	6.8	6.7	5.6	5.6

Annual Economic Indicators and Forecasts

Indicators	Units	FY9	FY10	FY11	FY12	FY13	FY14	FY15	FY16E	FY17E	FY18E
Real GDP/GVA growth	%	6.7	8.6	8.9	6.7	6.0	5.6	7.1	7.9	6.6	7.0
Agriculture	%	0.1	0.8	8.6	5.0	1.5	4.2	-0.2	0.7	4.9	6.5
Industry	%	4.1	10.2	8.3	6.7	5.0	4.5	6.5	10.2	7.0	6.4
Services	%	9.4	10.0	9.2	7.1	6.1	8.2	9.4	9.1	6.9	7.4
Real GDP	Rs Bn	41587	45161	49185	52475	85992	90844	97190	104905	111854	119694
Real GDP	US\$ Bn	908	953	1079	1096	1694	1581	1589	1603	1667	1841
Nominal GDP	Rs Bn	56301	64778	77841	87360	99466	112366	124451	136820	151837	167324
Nominal GDP	US\$ Bn	1229	1367	1707	1824	1828	1859	2035	2090	2264	2574
WPI (Average)	%	8.1	3.8	9.6	8.7	7.4	6.0	2.0	-2.5	3.7	2.5-3
CPI (Average)		9.0	12.4	10.4	8.3	10.2	9.5	6.4	4.9	4.5	2.5-3
Money Supply	%	20.5	19.2	16.2	15.8	13.6	13.5	12.0	10.3	7.3	9.5
CRR	%	5.00	5.75	6.00	4.75	4.00	4.00	4.0	4.0	4.0	4.0
Repo rate	%	5.00	5.00	6.75	8.50	7.50	8.00	7.50	6.75	6.25	5.75-6
Reverse repo rate	%	3.50	3.50	5.75	7.50	6.50	7.00	6.50	5.75	5.75	5.5-5.75
Bank Deposit growth	%	19.9	17.2	15.9	13.5	14.2	14.6	12.1	9.7	11.2	11.0
Bank Credit growth	%	17.5	16.9	21.5	17.0	14.1	13.5	12.5	10.7	4.7	7.0
Centre Fiscal Deficit	Rs Bn	3370	4140	3736	5160	5209	5245	5107	5328	5343	5465
Centre Fiscal Deficit	% of GDP	6.0	6.4	4.8	5.7	5.2	4.6	4.1	3.9	3.5	3.2
State Fiscal Deficit	% of GDP	2.4	2.9	2.1	1.9	2.0	2.2	2.6	3.6	3.0	3.5
Consolidted Fiscal Deficit	% of GDP	8.4	9.3	6.9	7.6	6.9	7.1	6.6	7.5	6.5	6.7
Exports	US\$ Bn	189.0	182.4	251.1	309.8	306.6	318.6	316.7	266.4	280.1	296.9
YoY Growth	%	13.7	-3.5	37.6	23.4	-1.0	3.9	-0.6	-15.9	5.2	6.0
Imports	US\$ Bn	308.5	300.6	381.1	499.5	502.2	466.2	460.9	396.4	392.6	443.6
YoY Growth	%	19.7	-2.5	26.7	31.1	0.5	-7.2	-1.1	-14.0	-1.0	13.0
Trade Balance	US\$ Bn	-119.5	-118.2	-129.9	-189.8	-195.6	-147.6	-144.2	-130.1	-112.4	-146.7
Net Invisibles	US\$ Bn	91.6	80.0	84.6	111.6	107.5	115.2	116.2	107.9	97.1	104.6
Current Account Deficit	US\$ Bn	-27.9	-38.2	-45.3	-78.2	-88.2	-32.4	-27.9	-22.2	-15.3	-42.1
CAD (% of GDP)	%	-2.3	-2.8	-2.6	-4.2	-4.7	-1.7	-1.4	-1.1	-0.7	-1.6
Capital Account Balance	US\$ Bn	7.8	51.6	62.0	67.8	89.3	48.8	90.0	41.1	36.5	66.4
Dollar-Rupee (Average)		45.8	47.4	45.6	47.9	54.4	60.5	61.2	65.5	67.0	64.5

Source: RBI, CSO, CGA, Ministry of Agriculture, Ministry of commerce, Bloomberg, PhillipCapital India Research

PhillipCapital India Coverage Universe: Valuation Summary

Name of company	Sector	CMP Rs	Mkt Cap Rs bn	Net Sales (Rs mn)		EBIDTA (Rs mn)		PAT (Rs mn)		EPS (Rs)		EPS Growth (%)		P/E (x)		P/B (x)		EV/EBITDA (x)		ROE (%)	
				FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E
Mahindra & Mahindra	Automobiles	1,335	829,314	469,648	512,657	64,339	70,743	38,972	42,877	66	72	5.7	10.0	20.3	18.5	2.7	2.5	13.2	12.0	13.4	13.3
Escorts	Automobiles	730	89,475	48,701	55,226	4,864	6,398	3,248	4,377	27	37	76.8	34.8	26.8	19.9	4.5	3.7	18.2	13.3	16.9	18.7
Tata Motors	Automobiles	435	1,378,765	2,882,226	3,233,423	358,292	511,906	85,415	171,957	27	53	43.2	101.3	16.4	8.1	2.1	1.7	5.5	3.7	13.1	21.3
Bharat Forge	Automobiles	695	323,654	82,880	93,446	17,594	20,766	9,065	11,280	39	48	59.3	24.4	17.9	14.3	3.5	2.9	19.0	16.0	19.3	20.2
Bajaj Auto	Automobiles	3,241	937,867	240,876	272,778	46,878	54,962	41,416	47,952	143	166	8.2	15.8	22.6	19.6	4.8	4.2	19.8	16.8	21.3	21.3
Hero MotoCorp	Automobiles	3,733	745,478	321,711	367,889	55,656	62,715	40,793	44,039	204	221	20.8	8.0	18.3	16.9	6.1	5.0	13.4	11.9	33.2	29.8
Apollo Tyres	Automobiles	237	120,715	146,541	163,475	18,093	23,837	9,154	12,457	18	24	-16.7	36.1	13.2	9.7	1.5	1.3	8.6	6.4	11.3	13.5
Mahindra CIE	Automobiles	246	93,204	66,956	72,789	9,384	10,440	5,040	6,258	13	17	37.1	24.1	18.5	14.9	2.2	2.3	9.7	8.6	13.7	15.3
Ceat	Automobiles	1,689	68,302	64,527	72,822	6,494	9,559	3,329	5,402	82	133	-19.2	62.3	20.6	12.7	2.6	2.2	11.5	7.7	12.6	17.4
Ramkrishna Forgings	Automobiles	734	23,922	10,900	13,306	2,189	2,803	529	989	16	30	144.3	87.0	45.2	24.2	3.3	2.9	13.5	10.1	7.2	12.0
Maruti Suzuki	Automobiles	8,215	2,481,678	752,966	852,355	111,138	130,183	79,929	94,348	265	312	8.9	18.0	31.0	26.3	5.8	4.9	22.4	19.1	18.7	18.7
Ashok Leyland	Automobiles	125	365,671	221,827	257,841	24,091	28,260	13,488	16,268	5	6	-14.3	20.6	26.4	21.9	4.9	4.1	15.0	12.4	18.5	18.6
BHEL	Capital Goods	98	358,512	305,572	336,381	18,613	28,947	11,072	18,991	5	8	7.6	71.5	21.6	12.6	0.7	0.7	13.0	8.2	3.3	5.5
Larsen & Toubro	Capital Goods	1,211	1,695,991	1,239,144	1,405,735	131,752	151,037	71,840	81,660	51	58	21.1	13.5	23.6	20.8	3.1	2.8	20.0	17.8	13.0	13.2
VA Tech Wabag	Capital Goods	588	32,096	34,907	38,142	3,376	3,897	1,624	2,049	30	38	60.1	26.2	19.7	15.6	2.9	2.5	9.4	7.5	14.5	16.0
CG Power & Industrial	Capital Goods	85	53,555	58,417	67,566	5,201	6,977	1,542	3,090	2	5	-15.6	100.5	34.7	17.3	1.3	1.3	11.1	8.4	3.7	7.2
GE T&D	Capital Goods	400	102,380	51,481	57,424	4,289	4,908	2,577	3,031	10	12	97.7	17.6	39.7	33.8	8.3	7.0	24.9	21.5	21.0	20.8
Voltas	Capital Goods	546	180,547	69,762	77,439	6,339	7,032	4,953	5,412	15	16	12.4	9.3	36.4	33.3	5.0	4.5	28.1	24.8	13.7	13.4
Bharat Electronics	Capital Goods	185	455,158	100,063	110,024	19,075	20,850	14,920	16,683	7	7	-9.9	11.8	27.7	24.8	5.0	4.5	21.1	18.4	18.0	17.9
Engineers India	Capital Goods	184	123,689	17,441	27,307	3,355	5,373	3,296	4,399	5	7	-8.3	33.4	35.2	26.4	5.3	4.8	30.9	19.0	14.9	18.4
KEC International	Capital Goods	306	78,746	96,410	111,795	9,767	11,573	4,202	5,355	16	21	25.6	27.4	18.7	14.7	4.0	3.3	9.6	8.1	21.6	22.3
Cummins India	Capital Goods	896	248,496	54,701	63,351	9,104	10,812	8,206	9,511	31	34	17.7	10.0	28.7	26.1	6.1	5.7	27.2	22.9	20.1	21.8
Siemens	Capital Goods	1,273	453,216	116,504	138,484	13,303	16,040	8,660	10,509	24	30	36.5	21.4	52.3	43.1	6.1	5.7	31.0	25.5	11.7	13.2
ABB India	Capital Goods	1,385	293,483	96,854	111,109	8,853	11,137	4,925	6,369	23	30	31.5	29.3	59.6	46.1	8.1	7.3	32.1	25.4	13.6	15.8
Thermax	Capital Goods	976	116,350	48,706	53,918	4,655	5,827	2,976	3,827	25	32	0.2	28.6	39.1	30.4	4.2	3.8	24.4	19.1	10.8	12.6
Inox Wind	Capital Goods	138	30,669	50,119	58,869	7,735	9,283	4,493	5,712	20	26	-1.6	27.1	6.8	5.4	1.2	1.0	4.0	3.1	17.7	19.3
India Cement	Cement	189	58,379	63,900	68,226	9,480	11,346	2,737	4,253	9	14	67.8	55.4	21.3	13.7	1.1	1.1	9.2	7.4	5.2	7.7

PhillipCapital India Coverage Universe: Valuation Summary

		CMP	Mkt Cap	Net Sales (Rs mn)	EBIDTA (Rs mn)	PAT (Rs mn)	EPS (Rs)	EPS Growth (%)	P/E (x)	P/B (x)	EV/EBITDA (x)	ROE (%)											
Name of company	Sector	Rs	Rs bn	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E										
JK Lakshmi Cement	Cement	435	51,181	35,758	39,746	5,350	7,012	1,542	2,726	13	23	90.9	76.8	33.2	18.8	3.3	2.9	12.6	9.3	10.0	15.6	8.6	12.0
JK Cement	Cement	1,008	70,491	43,854	51,242	8,331	9,477	3,012	3,876	43	55	32.6	28.7	23.4	18.2	3.5	3.1	11.2	9.6	15.1	17.3	9.1	10.4
Mangalam Cement	Cement	394	10,508	9,922	11,413	1,628	2,257	682	1,096	26	41	98.6	60.6	15.4	9.6	1.8	1.6	8.7	5.7	11.7	16.7	8.9	12.7
Dalmia Bharat	Cement	3,073	273,419	88,437	97,219	24,976	28,096	6,608	8,769	74	99	91.6	32.7	41.3	31.1	5.7	4.8	12.8	10.9	13.7	15.4	9.4	10.5
Ambuja Cement	Cement	280	555,087	239,971	277,037	38,078	48,425	17,400	22,120	9	11	34.7	27.1	31.9	25.1	2.7	2.6	13.3	10.5	8.6	10.3	8.0	9.9
Ultratech Cement	Cement	4,399	1,207,715	338,001	446,092	71,792	99,280	32,513	46,454	118	169	19.8	42.9	37.1	26.0	4.4	3.8	19.1	13.4	11.9	14.8	9.2	10.4
HeidelbergCement India	Cement	155	35,023	19,946	21,147	3,182	3,605	1,164	1,602	5	7	72.2	37.6	30.1	21.9	3.3	2.9	12.4	10.3	10.9	13.1	8.6	10.0
ACC	Cement	1,799	337,904	126,710	145,238	15,811	21,987	8,286	12,444	44	66	28.9	50.2	40.8	27.2	3.8	3.6	20.3	14.7	9.3	13.2	8.1	11.7
OCL India	Cement	1,474	83,854	33,165	-	6,592	-	3,721	-	65	15.4	-	22.5	-	4.3	-	11.8	-	19.3	-	20.6	-	-
Shree Cement	Cement		666,377	100,942	119,136	29,401	37,197	15,868	20,868	455	599	18.7	31.5	42.0	31.9	8.2	6.9	21.8	17.1	19.5	21.5	19.4	23.4
ICICI Bank	Banks	317	2,031,671	226,675	252,895	227,622	229,629	77,783	99,070	12	15	-28.0	27.1	26.1	20.6	2.0	1.9	8.9	8.8	7.7	9.4	1.7	1.7
State Bank of India	Banks	314	2,713,485	766,859	848,570	526,645	566,964	93,642	178,356	11	21	-597.7	90.5	28.9	15.1	1.4	1.3	5.2	4.8	5.0	8.7	0.3	0.5
Bank of Baroda	Banks	170	390,670	144,105	166,072	109,408	114,325	13,413	39,306	6	17	-3.0	193.0	29.2	10.0	1.0	1.0	3.6	3.4	3.6	10.0	0.2	0.5
Punjab National Bank	Banks	197	419,848	165,019	200,775	151,294	178,557	21,145	43,048	10	19	55.5	99.0	20.4	10.2	1.0	0.9	2.8	2.4	101.6	132.4	0.3	0.6
LIC Housing Finance	Banks	605	305,498	37,364	41,824	32,587	36,361	20,156	22,642	40	45	4.4	12.3	15.2	13.5	2.4	2.1	9.4	8.4	16.9	16.6	1.3	1.3
Repco Home Finance	Banks	613	38,378	4,069	4,848	3,644	4,327	1,973	2,500	32	40	8.2	26.6	19.5	15.4	3.0	2.5	10.5	8.9	16.3	17.7	2.0	2.2
Canara Bank	Banks	403	240,529	113,918	130,134	92,397	93,958	10,996	14,945	18	24	-34.3	33.7	22.3	16.7	0.8	0.8	2.6	2.6	3.8	4.9	0.2	0.2
HDFC Limited	Banks	1,762	2,806,841	110,346	127,268	120,602	138,216	78,938	89,903	50	57	6.1	13.9	35.5	31.1	6.4	5.7	23.3	20.3	18.9	19.3	2.3	2.2
AXIS Bank	Banks	532	1,275,880	187,025	210,987	160,239	169,786	46,588	70,829	19	29	26.0	51.3	27.5	18.2	-	2.0	8.0	7.5	-	11.6	-	1.1
Indian Bank	Banks	336	161,354	60,389	68,718	46,374	50,325	19,345	23,991	37	45	25.3	24.0	9.2	7.4	1.0	0.9	3.5	3.2	10.5	8.3	0.7	0.5
HDFC Bank	Banks	1,822	4,708,300	401,934	476,616	311,413	370,126	177,343	212,107	69	83	21.9	19.6	26.3	22.0	4.5	3.9	15.1	12.7	18.4	19.1	2.0	2.0
Indusind Bank	Banks	1,628	974,558	77,698	98,061	70,841	89,858	38,433	49,655	64	83	34.0	29.2	25.3	19.6	4.1	3.4	13.8	10.8	17.2	19.0	2.0	2.1
DCB Bank	Banks	180	55,461	9,910	12,277	5,367	7,118	2,754	3,847	9	13	28.2	39.7	20.1	14.4	1.9	1.7	10.3	7.8	10.9	12.5	1.1	1.2
Union Bank	Banks	171	124,256	94,881	105,446	72,152	70,586	5,240	8,474	6	9	-20.2	41.2	26.5	18.8	0.5	0.5	1.7	1.8	4.5	9.3	0.1	0.2
Oriental Bank of Com	Banks	139	48,014	52,521	58,194	39,907	41,551	-5,441	-1,222	-14	-3	-54.6	-79.1	-9.7	-46.2	0.4	0.4	1.2	1.2	-4.3	-1.0	-0.2	-0.0
Dewan Housing Fin	Banks	650	203,730	23,486	28,015	19,846	24,239	11,423	14,462	-	-	-	-	-	-	-	-	10.3	8.4	13.4	15.0	1.2	1.3
Britannia	FMCG	4,658	559,223	102,978	115,529	15,080	18,408	10,185	12,246	85	102	28.5	20.2	54.8	45.6	16.4	13.2	36.6	29.8	29.8	28.8	32.3	31.2

PhillipCapital India Coverage Universe: Valuation Summary

	CMP	Mkt Cap	Net Sales (Rs mn)	EBIDTA (Rs mn)	PAT (Rs mn)	EPS (Rs)	EPS Growth (%)	P/E (x)	P/B (x)	EV/EBITDA (x)	ROE (%)											
	Rs	Rs bn	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E										
Jubilant Foodworks	1,618	106,742	29,016	32,884	2,669	3,262	1,111	13	17	38.0	33.3	127.1	95.3	11.6	10.3	39.6	32.2	9.1	10.9	9.1	11.0	
ITC	266	3,235,089	422,736	468,424	162,039	185,526	111,133	126,312	9	11	6.4	13.7	28.7	25.3	9.1	8.9	19.5	17.0	31.5	35.1	23.9	26.6
Hindustan Unilever	1,242	2,687,199	393,154	437,031	79,598	89,039	52,150	58,426	24	27	20.3	12.0	51.6	46.1	35.7	30.9	33.3	29.6	69.1	67.0	73.8	72.4
Colgate	1,040	282,743	42,826	48,660	10,239	12,680	6,319	7,848	23	29	9.4	24.2	44.7	36.0	18.7	15.4	27.5	21.9	41.9	42.7	45.4	46.9
Glaxo Smithkline Cons	5,384	226,423	45,920	51,195	7,638	8,718	8,060	9,157	192	218	12.7	13.6	28.1	24.7	7.2	6.3	24.8	21.3	25.6	25.7	27.2	27.3
Titan Company	655	581,633	146,821	168,169	14,271	17,027	9,640	11,658	11	13	23.8	20.9	60.3	49.9	11.9	10.3	40.3	33.8	21.0	22.1	21.6	22.2
Asian Paints	1,178	1,130,319	191,772	221,379	32,416	38,431	21,620	25,753	23	27	7.2	19.1	52.3	43.9	12.9	11.3	34.5	29.0	24.7	25.6	24.0	25.1
Godrej Consumer Prod	978	666,340	103,223	114,634	21,554	24,001	15,061	16,866	22	25	43.1	12.0	44.2	39.5	10.2	8.5	31.5	27.8	23.1	21.5	17.1	17.5
Emami	1,257	285,196	35,115	39,502	9,503	10,695	6,661	7,537	29	33	21.1	13.2	42.8	37.8	15.2	12.7	29.7	25.8	35.4	33.7	22.1	23.9
Agro Tech Foods	538	13,118	8,558	9,174	760	913	389	499	16	20	57.4	28.3	33.7	26.3	3.4	3.1	17.6	14.3	10.0	11.9	9.8	11.7
Marico Industries	312	403,143	73,527	83,627	14,084	16,186	9,762	11,311	8	9	13.9	15.9	41.3	35.6	13.4	11.3	27.9	24.0	32.5	31.8	30.8	30.6
Dabur India	342	602,968	84,552	93,342	16,043	18,061	13,803	15,648	8	9	8.1	13.4	43.7	38.5	10.7	9.1	37.8	33.0	24.4	23.6	22.3	22.1
Bajaj Corp	468	69,001	8,482	9,324	2,679	2,995	2,374	2,650	16	18	1.9	11.6	29.1	26.0	15.1	16.0	25.9	23.3	51.9	61.5	49.7	59.4
Parag Milk Foods	271	22,829	19,114	22,326	2,058	2,535	980	1,278	12	15	31.4	30.4	23.3	17.9	2.8	2.4	11.5	9.1	11.8	13.4	12.6	14.1
Nestle	7,288	702,663	103,361	115,903	20,593	23,864	12,062	14,252	125	148	19.5	18.2	58.3	49.3	21.3	19.4	34.0	28.5	36.6	39.4	37.9	40.9
Sadbhav Engineering	311	53,281	38,184	43,911	4,105	4,830	1,985	2,140	12	12	5.7	7.8	26.8	24.9	2.9	2.6	16.6	14.1	10.7	10.4	9.4	9.2
KNR Construction	278	39,078	16,359	20,448	2,290	2,863	1,364	1,548	10	11	12.8	13.5	28.7	25.2	4.0	3.5	18.0	14.5	15.0	14.7	13.6	13.3
JKumar Infra	251	18,962	17,250	21,562	2,932	3,666	1,184	1,614	16	21	12.2	36.4	16.0	11.7	1.3	1.2	7.6	6.4	8.2	10.3	8.3	9.8
IRB Infrastructure	241	84,770	63,658	70,244	35,748	41,446	6,561	6,920	19	20	1.9	5.5	12.9	12.2	1.3	1.2	6.8	5.7	10.0	9.7	3.8	4.3
Ahluwalia Contracts	311	20,850	16,120	19,344	2,055	2,611	1,121	1,544	17	23	30.3	37.8	18.6	13.5	3.5	2.9	10.0	7.7	20.3	23.3	19.6	22.8
PNC Infotech	204	52,244	24,170	29,004	3,190	3,829	1,849	2,057	7	8	-6.2	11.3	28.3	25.4	3.0	2.7	16.4	13.7	11.3	11.4	11.1	11.2
Adani Ports & SEZ	437	905,524	100,576	115,115	64,808	74,459	35,135	41,955	17	20	-5.9	19.4	25.8	21.6	4.4	3.7	16.9	14.3	16.9	17.0	10.8	11.5
NCC	110	61,013	99,079	113,933	9,165	10,539	3,708	4,636	7	8	33.1	25.0	16.5	13.2	1.5	1.4	8.3	7.3	9.3	10.5	11.1	11.7
ITD Cementation	186	28,929	28,780	-	3,022	-	1,214	-	8	-	23.2	-	23.8	-	3.8	-	10.9	-	16.0	-	15.6	-
Hindustan Construction	39	39,822	41,400	49,680	4,968	5,962	1,524	3,049	2	3	89.0	100.1	26.1	13.1	1.4	1.3	12.3	9.9	5.5	10.2	6.4	8.7
Ashoka Buildcon	234	43,699	34,938	40,130	10,142	10,872	-406	-310	-2	-2	291.5	-23.6	-107.6	-140.8	2.7	2.8	8.7	8.0	-2.5	-2.0	6.1	6.5
Cyient Limited	544	61,217	38,998	43,692	5,383	6,376	4,098	4,823	36	43	10.7	17.7	14.9	12.7	2.6	2.3	9.6	7.8	17.2	17.8	16.3	17.2

PhillipCapital India Coverage Universe: Valuation Summary

		CMP	Mkt Cap	Net Sales (Rs mn)		EBIDTA (Rs mn)		PAT (Rs mn)		EPS (Rs)		EPS Growth (%)		P/E (x)		P/B (x)		EV/EBITDA (x)		ROE (%)	
Name of company	Sector	Rs	Rs bn	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E
L&TTechnology Serv	IT Services	827	84,351	35,630	40,556	6,297	7,565	4,807	5,737	47	56	13.1	19.3	17.5	14.7	4.4	3.5	13.7	11.3	25.3	24.1
Tech Mahindra	IT Services	468	456,623	316,144	337,980	49,836	55,179	32,481	36,377	37	42	11.8	12.0	12.6	11.3	2.4	2.0	8.6	7.4	18.7	18.2
HCL Technologies	IT Services	856	1,221,074	504,696	544,999	108,405	117,064	84,599	90,831	61	65	1.3	7.4	14.1	13.1	2.9	-	11.2	10.2	22.8	22.2
NITITechnologies	IT Services	644	39,547	30,453	32,652	5,094	5,544	2,921	3,248	48	53	11.3	11.2	13.5	12.1	2.1	2.0	6.0	5.2	15.2	16.3
KPIITechnologies	IT Services	149	29,358	35,485	37,438	4,296	4,669	2,642	2,891	14	15	13.9	9.4	10.8	9.9	1.6	1.4	6.1	5.1	14.6	13.7
Persistent Systems	IT Services	655	52,380	31,926	34,204	5,190	5,689	3,493	3,805	44	48	10.1	9.0	15.0	13.8	2.4	2.2	9.7	8.7	16.3	15.6
Wipro	IT Services	293	1,427,157	580,828	610,615	114,608	121,746	90,660	96,598	37	40	8.1	6.5	7.8	7.4	1.3	1.2	12.7	11.6	16.3	15.6
Mindtree	IT Services	474	79,665	58,111	62,793	8,385	9,256	5,425	5,948	32	35	20.4	9.6	14.7	13.4	2.7	2.4	9.1	8.0	18.2	17.7
Tata Consultancy	IT Services	2,626	5,174,639	1,295,897	1,380,128	343,516	358,423	274,608	287,294	139	146	5.5	4.6	18.8	18.0	5.1	4.9	14.7	14.0	27.0	27.0
Infosys Technologies	IT Services	923	2,119,895	775,133	852,350	211,246	229,930	164,562	178,936	72	78	14.4	8.7	12.8	11.8	2.7	2.7	7.9	7.2	21.3	22.9
Intellect Design Aiena	IT Services	148	19,969	10,040	11,187	756	906	299	447	-	-	-	-	-	-	2.4	2.3	29.8	25.1	-	-
Majesco	IT Services	526	12,382	8,185	9,883	18	504	-90	226	-4	10	-163.9	-350.3	-136.9	54.7	4.3	4.0	645.7	23.2	-3.1	7.2
Dish TV	Media	76	81,068	31,694	34,904	9,954	12,365	1,614	2,633	2	2	5.0	63.1	50.2	30.8	12.2	8.8	8.4	6.2	24.4	28.5
Hindustan Media Vent	Media	234	17,192	10,021	10,741	2,332	2,641	2,145	2,478	29	34	10.8	15.5	8.0	6.9	1.3	1.1	7.0	5.4	15.6	15.4
DB Corp Limited	Media	370	68,047	24,602	26,994	7,192	8,230	4,325	5,153	24	28	16.0	19.1	15.7	13.2	3.7	3.3	8.8	7.4	23.5	24.7
Zee Entertainment	Media	529	508,317	67,083	75,250	21,685	25,223	15,053	17,946	16	19	46.6	19.2	33.8	28.3	4.9	4.5	20.9	17.7	14.5	16.0
Jagran Prakashan	Media	179	58,468	24,808	27,029	7,171	5,500	4,327	5,179	14	33	16.5	139.4	13.1	5.5	2.6	-	7.8	10.6	19.5	15.7
Ortel Communications	Media	31	952	3,025	3,468	1,084	1,308	88	319	3	11	-29.9	262.7	10.8	3.0	0.6	0.5	2.4	1.6	5.5	16.6
HT Media	Media	103	23,857	26,025	27,677	3,449	3,783	2,063	2,375	9	10	21.1	15.1	11.6	10.0	0.9	0.8	7.7	6.1	8.1	8.4
Hindalco Inds	Metals	271	607,570	1,071,588	1,074,324	137,352	138,599	33,525	45,005	16	22	11.5	34.2	16.7	12.4	1.3	1.2	8.4	7.8	7.6	9.3
JSW Steel	Metals	266	643,464	591,212	631,337	147,638	157,297	50,833	56,318	210	233	17.8	10.8	1.3	1.1	0.2	0.2	6.9	5.9	19.0	17.6
Tata Steel	Metals	706	685,776	1,239,565	1,267,471	210,463	221,444	68,724	79,305	71	82	74.1	15.4	10.0	8.6	1.9	1.6	6.9	6.2	18.5	18.0
Hindustan Zinc	Metals	322	1,359,496	211,706	234,043	126,959	146,435	97,857	116,770	23	28	17.7	19.3	13.9	11.6	3.7	3.1	9.0	7.3	26.4	26.2
Vedanta	Metals	341	1,265,705	876,762	999,234	247,270	314,566	95,991	145,571	26	39	70.6	51.7	13.2	8.7	1.9	1.6	7.2	5.3	14.3	18.7
NALCO	Metals	93	179,859	88,024	92,129	18,482	21,029	11,467	13,078	6	7	120.3	14.1	15.7	13.8	1.7	1.6	8.1	7.2	10.8	11.6
SAIL	Metals	80	329,581	511,379	565,680	44,805	68,841	-4,909	6,952	-1	2	-81.2	-241.6	-67.1	47.4	0.9	0.9	17.4	11.2	-1.3	1.9
Praj Inds.	Logistics	77	13,882	14,084	16,481	1,931	2,474	1,354	1,754	8	10	69.5	29.5	10.1	7.8	1.9	1.6	6.6	4.8	18.3	20.8

PhillipCapital India Coverage Universe: Valuation Summary

		CMP	Mkt Cap	Net Sales (Rs mn)	EBIDTA (Rs mn)	PAT (Rs mn)	EPS (Rs)	EPS Growth (%)	P/E (x)	P/B (x)	EV/EBITDA (x)	ROE (%)	ROCE (%)										
Name of company	Sector	Rs	Rs bn	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E										
Pennar Inds.	Logistics	69	8,298	19,052	22,465	2,411	2,375	893	562	7	5	32.9	-37.0	9.3	14.8	1.3	1.2	4.4	4.3	14.0	7.8	15.9	11.5
Indo Count Industries	Logistics	112	22,148	20,813	22,707	3,329	3,782	1,800	2,121	9	11	-22.5	17.9	12.3	10.4	2.2	1.9	7.3	6.5	18.0	18.2	17.1	17.4
PEBS	Logistics	104	3,553	5,700	6,939	618	813	268	368	8	11	10.0	37.1	13.2	9.7	1.4	1.3	6.5	5.2	10.9	13.4	12.0	14.2
Sintex Industries	Logistics	27	15,119	108,439	123,311	20,034	22,374	8,378	8,641	16	17	30.7	3.1	1.7	1.6	0.2	0.2	4.5	4.0	11.4	10.6	7.1	7.4
KDDL	Logistics	235	2,543	5,513	6,569	459	609	97	166	10	16	228.4	70.0	24.3	14.3	2.8	2.5	8.7	6.5	11.4	17.2	7.8	10.1
Gateway Distriparks	Logistics	272	29,579	4,325	4,920	1,119	1,388	1,058	1,487	10	14	42.8	40.5	27.9	19.9	2.9	2.8	28.3	22.7	10.4	13.9	9.9	13.5
Container Corp Of India	Logistics	1,379	336,196	59,870	70,369	12,599	15,497	8,952	11,010	37	45	24.5	23.0	37.6	30.5	3.6	3.4	26.5	21.5	9.6	11.2	9.9	11.6
Navkar	Logistics	194	27,595	7,908	9,875	3,161	3,998	2,047	2,751	14	19	71.6	34.4	13.5	10.0	1.6	1.4	9.5	6.8	12.2	13.6	11.5	13.3
Allcargo Logistics	Logistics	179	44,999	60,190	66,166	5,036	5,769	2,561	3,154	10	13	10.5	23.1	17.6	14.3	2.3	2.1	9.7	8.4	13.0	14.4	11.9	12.6
VRL Logistics	Midcap	370	33,774	18,945	20,659	2,477	2,957	967	1,229	11	13	37.2	27.1	34.9	27.5	5.8	5.3	14.1	11.7	16.7	19.3	12.9	15.7
V-Guard Industries	Midcap	225	95,505	5,700	6,939	618	813	268	368	8	11	10.0	37.1	28.7	21.0	3.1	2.8	155.4	118.4	10.9	13.4	12.0	14.2
Bajaj Electricals	Midcap	393	39,899	46,459	-	3,127	-	1,635	-	16	-	51.8	-	24.4	-	3.2	-	14.1	-	13.2	-	10.9	-
Finolex Cables	Midcap	626	95,679	5,700	6,939	618	813	268	368	8	11	10.0	37.1	80.0	58.3	8.7	7.8	155.7	118.6	10.9	13.4	12.0	14.2
KEI Industries	Midcap	337	26,226	30,113	34,939	3,238	3,934	2,930	3,610	38	46	19.0	23.2	9.0	7.3	4.5	3.5	10.0	8.0	50.0	48.7	23.8	27.6
Havells India	Midcap	496	310,199	86,487	100,382	10,564	12,827	6,382	7,952	10	13	6.9	24.6	48.6	39.0	8.6	7.7	29.6	24.1	17.7	19.7	16.5	18.4
Muthoot Finance	NBFC	506	202,261	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shriram City Union Fin	NBFC	2,327	153,453	32,249	38,763	20,243	24,144	7,699	9,889	117	150	38.5	28.4	19.9	15.5	2.7	2.4	7.6	6.4	14.4	16.2	2.9	3.1
Cholamandalam Invest	NBFC	1,244	194,417	28,544	35,198	17,668	21,712	8,948	11,170	57	71	24.5	24.8	21.7	17.4	3.8	3.2	11.0	9.0	19.0	20.0	2.7	2.8
Shriram Transport Fina	NBFC	1,302	295,379	61,031	69,773	47,627	54,525	18,437	21,647	81	95	46.6	17.4	16.0	13.6	2.3	2.0	6.2	5.4	15.2	15.6	2.3	2.4
Mah & Mah Finance	NBFC	436	248,124	37,312	45,326	25,973	30,639	8,946	12,696	14	21	104.3	41.9	30.1	21.2	2.9	2.6	9.6	8.1	11.3	12.9	1.8	2.1
Manappuram Finance	NBFC	101	84,700	23,348	29,584	13,306	16,519	8,415	10,404	10	12	28.7	23.6	10.1	8.1	2.2	1.8	6.4	5.1	23.4	23.8	5.1	5.1
Magma Fincorp	NBFC	178	42,146	12,482	13,931	6,726	8,146	2,313	3,722	10	16	1,716.3	60.9	18.2	11.3	1.8	1.6	6.3	5.2	10.2	14.7	1.7	2.5
Indiabulls Housing Fin	NBFC	1,230	521,840	50,764	63,843	57,945	73,111	35,662	44,759	-	-	-	-	-	-	-	-	9.0	7.1	28.0	31.8	3.0	2.9
Bharat Financial Includ	NBFC	972	134,291	11,500	16,436	6,204	9,045	5,707	5,530	41	39	94.9	-4.1	23.7	24.7	4.5	3.8	21.6	14.8	20.9	16.8	4.6	3.3
Castrol India	Oil & Gas	410	202,894	39,952	42,789	11,988	12,830	8,098	8,651	16	17	13.6	6.8	25.1	23.5	27.0	24.2	16.1	15.0	107.9	103.2	128.2	123.6
Indraprastha Gas	Oil & Gas	1,572	220,024	36,908	42,092	11,034	12,546	6,722	7,741	48	55	17.7	15.1	32.7	28.4	6.5	5.6	19.2	16.7	19.8	19.8	17.4	17.5
Gujarat State Petronet	Oil & Gas	209	117,996	11,959	13,006	10,641	11,546	6,537	7,077	12	13	31.6	8.3	18.0	16.7	2.4	2.1	10.8	9.6	13.1	12.9	11.5	11.4

PhillipCapital India Coverage Universe: Valuation Summary

		CMP	Mkt Cap	Net Sales (Rs mn)		EBIDTA (Rs mn)		PAT (Rs mn)		EPS (Rs)		EPS Growth (%)		P/E (x)		P/B (x)		EV/EBITDA (x)		ROE (%)			
Name of company	Sector	Rs	Rs bn	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E	FY18E	FY19E		
GUJARAT GAS	Oil & Gas	922	126,994	55,979	65,711	10,526	12,658	4,019	5,423	29	39	83.1	34.9	31.6	23.4	6.5	5.4	14.1	11.5	20.6	23.0	8.9	10.6
Gulf Oil Lubricants	Oil & Gas	796	39,532	12,518	14,598	2,143	2,572	1,482	1,684	30	34	22.4	13.6	26.6	23.5	9.0	7.4	18.0	14.9	33.7	31.6	28.0	28.3
Petronet LNG	Oil & Gas	263	393,825	270,164	296,606	31,067	34,137	20,665	23,464	14	16	-39.4	13.5	19.1	16.8	4.1	3.5	11.8	10.4	21.6	20.9	17.5	18.2
Reliance Industries	Oil & Gas	947	6,159,751	3,496,944	3,674,568	584,973	605,572	298,152	319,565	101	108	35.5	7.0	9.4	8.8	1.0	0.9	13.1	12.4	10.3	10.1	7.2	7.2
Mangalore Refinery	Oil & Gas	138	241,946	444,981	467,249	45,534	50,348	23,441	27,772	13	16	14.5	18.5	10.3	8.7	2.1	1.8	6.4	5.4	20.3	20.8	14.9	16.1
Chennai Petroleum	Oil & Gas	463	68,909	296,439	317,455	17,923	22,176	8,422	10,198	57	68	-22.8	21.1	8.2	6.8	1.8	1.5	6.9	5.4	21.9	22.6	12.1	13.5
Ipca Laboratories	Pharma	527	66,455	35,868	41,753	5,882	7,960	3,121	4,627	25	37	68.3	48.2	21.1	14.3	2.4	2.0	11.7	8.4	11.2	14.2	9.3	12.5
Aurobindo Pharma	Pharma	789	462,408	175,659	191,408	42,158	46,321	26,807	29,399	46	51	17.0	9.7	17.1	15.6	4.0	3.3	11.5	10.2	23.5	20.9	22.8	21.4
Divi's Laboratories	Pharma	1,073	284,821	39,944	45,488	13,165	15,446	9,116	10,788	34	41	-17.1	18.3	31.2	26.4	5.1	4.5	21.6	18.2	16.2	16.9	-	-
Cadila Healthcare	Pharma	508	519,959	119,958	124,571	26,603	29,409	19,005	20,868	19	20	31.2	9.8	27.4	24.9	6.4	5.3	20.1	17.8	23.0	20.8	17.2	16.5
Sun Pharma	Pharma	760	104,866	15,045	316,536	7,642	79,102	6,671	48,210	48	20	2.9	-58.1	15.8	37.8	0.0	4.3	13.7	-0.7	21.5	11.4	5.6	9.8
Cipla	Pharma	636	511,780	16,227	18,407	4,300	5,246	1,817	2,333	23	29	39.4	28.4	28.1	21.9	3.5	3.1	119.7	97.9	21.9	23.7	-	-
Lupin	Pharma	1,061	479,492	165,209	182,413	37,000	45,496	19,821	25,681	44	57	-31.6	29.6	24.2	18.7	3.2	2.8	14.4	11.4	13.0	14.8	-	-
Glenmark Pharma	Pharma	648	182,958	95,012	103,716	22,898	25,164	12,894	14,601	46	52	-1.9	13.2	14.2	12.5	3.0	2.5	9.5	8.4	21.3	19.6	14.4	14.9
Dr Reddy's Labs.	Pharma	2,411	399,791	151,422	171,097	28,013	36,786	14,082	20,570	83	121	17.0	46.1	29.2	20.0	3.1	2.7	15.6	11.6	10.5	13.5	6.3	8.8
Biocon	Pharma	380	228,180	46,609	55,338	10,215	13,236	5,331	7,213	9	12	-13.2	35.3	42.8	31.6	4.8	4.4	24.1	18.8	10.6	13.2	9.7	12.1
SRF	Specialty Che	1,743	100,061	55,780	62,722	9,483	12,607	4,105	6,305	71	110	-15.8	53.6	24.4	15.9	2.9	2.5	13.2	9.9	11.7	15.5	7.5	10.1
Meghmani Organics	Specialty Che	119	30,340	17,163	20,358	3,398	4,296	1,180	1,428	5	6	73.0	21.0	25.7	21.2	3.6	3.1	10.1	8.3	14.1	14.6	12.7	13.8
Camlin Fine Sciences	Specialty Che	84	8,727	7,425	9,790	1,040	1,586	459	854	4	8	-506.4	86.1	19.0	10.2	3.5	2.6	11.4	7.6	19.6	27.1	-	-
Aarti Industries	Specialty Che	947	77,760	35,413	40,998	7,189	8,814	3,531	4,565	43	56	11.8	29.3	22.0	17.0	4.7	3.8	12.8	10.7	22.4	22.8	-	-
Vinati Organics	Specialty Che	997	51,441	8,751	11,653	2,549	3,737	1,649	2,356	32	46	21.3	42.9	31.2	21.8	6.1	4.8	20.9	14.4	19.5	21.8	-	-
Atul	Specialty Che	2,452	72,720	33,552	37,612	5,435	6,544	3,337	4,103	112	138	3.3	23.0	21.8	17.7	3.2	2.8	13.2	10.5	14.6	15.4	-	-
Idea Cellular	Telecom	107	384,851	354,183	372,687	92,980	97,327	-19,820	-24,807	-6	-7	395.8	25.2	-19.4	-15.5	1.7	2.0	9.7	9.2	-9.0	-12.7	0.5	0.1
Bharti Airtel	Telecom	543	2,171,388	914,244	1,003,275	318,695	374,894	39,100	90,613	10	23	-26.8	131.7	55.6	24.0	2.9	2.6	10.5	8.7	5.3	10.9	4.9	6.9
Bharti Infratel	Telecom	419	774,338	93,542	101,747	66,639	73,529	30,998	34,689	17	19	12.7	11.9	25.0	22.4	5.3	5.7	10.9	9.8	21.4	25.6	15.7	18.2
Tata Communications	Telecom	681	194,000	188,796	200,469	28,498	32,949	4,408	7,493	15	26	49.8	70.0	44.0	25.9	20.4	24.2	9.4	8.0	46.4	93.6	4.7	7.2

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