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Demand-based Project Through Citizen's Participation
Jalgaoan River Linking Project

Government of Maharashtra
Jalgaon River Linking Project
Demand-based Project Through Citizen's Participation
The Jalgaon River Linking Project is an innovative response to the perennial problem of un-equal distribution of water in the district. The paradox of a flood-like situation in certain parts and drought conditions in other parts of the district was the genesis for the river linking project.

The project provided a lasting solution to the problem of water scarcity in several parts in the district. The project was brought immense benefits to all stakeholders for the urban and rural parts in the district, it increased the availability of drinking water especially in the summer month and for the agricultural community it increased land available for cultivation.

The project brought multiple government agencies/stakeholders District Administration, Irrigation Department, Municipal Bodies and local elected representatives on a single platform to make the project successful. Moreover the participatory approach in planning right at the conception stage ensured that the local communities contributed significantly in making the project successful. The local community provided free labour in executing the project. Several land-owners gave up part of their land parcels to implement the project. The parting of the non-productive land made remaining land parcels productive on account of water being made available for irrigation. The commonality of objective led to the project being implemented in record time and with minimal funding from the Government. The success of the project has led State Government of Maharashtra encourage District Administrators to explore the possibility of replicating this model in their jurisdictions.

The Department of Administrative Personnel, Government of India has identified this project as a good governance initiative. This project has also received the Prime Minister's Award for Excellence in Public Administration. This Project Note is intended to disseminate the project background and experiences in making this project a success.
Introduction

Water is a basic necessity of life. High rate of population growth and rapid improvement in the civilization due to advancement in technology for better life, mankind is fascinated with enhanced application of water for its day-to-day multi facet requirements. These requirements are due to greater municipal demands, heavy industrialization, improved agricultural methods and area recreation etc. Therefore, water is considered as a prime natural resource, a basic human need and a valuable national asset. Though fresh water is available in abundance, it is not equitably distributed. Till the middle of the 20th century, the importance of water on life had not been particularly felt because of its moderate demand. But relentless increase in the demand of fresh water in recent years has led to the scarcity of the basic resource in many countries of the world. Such spurt in demand is caused by

i) Rapid growth of population

ii) Increase in urbanisation and industrialisation

iii) High intake of fresh water in irrigation for additional food production

iv) Misuse and wastage of fresh water in miscellaneous ways.

This has resulted in scarcity of water in various countries, even for drinking. Solving these water resource problems will require an improved understanding of the fundamental physical, biological, economic and social processes and a better knowledge of how all these components operate together within watershed. The area under study comprises of Jalgaon District which is located in the north-west region of the state of Maharashtra between 20° and 21° North latitudes and 74° 55' to 76° 28' East longitudes.

The District is mainly drained by major river Tapi, with its tributaries Bhokar, Suki, Hadkai, Ratnawati, Aner on the left bank and Girna, Waghur, Bori, Ajani and panzara on right bank. There are two major dams in the Tapi Basin viz. Hatnur and Girna. In rainy season 2005, the outflowing water of Girna river was utilized in drought prone area by diverting flood water into existing canal system, by increasing the capacity of canals by constructing new approach canal. The water was supplied to the drought prone areas, which had received scanty rainfall. In view of the above, the River Linking Project was planned and proposed.
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Preamble

The July 2005 torrential rains in Maharashtra bring back memories of losses of hundreds of lives, destruction to property and inconveniences caused to many in the state. Images of people in distress in Mumbai on 26th July 2005, publicized by the media, both print and television, are still fresh in everybody's minds. The media blitzkrieg on tales of helplessness against the fury of the monsoon that followed, ignored stories of how citizens used this crisis to effect important remedial changes. One such case that missed the media glare is the Jalgaon River Linking Project.

Water is the basic necessity of life. Water finds its use of agriculture, industry and drinking purposes. As population expands there is increasing demand for water for competing uses. The world population crossed the one billion mark for the first time only in 1803. It has taken less than two hundred years to add the next five billion. It took only 14 years to add the last one billion. The amount of water available per capita would have drastically come down. The message is very clear there is a need to manage with less amount of water per capita than it was ever before.

The declining availability of water in the light of population explosion is further compounded by the fact that water resources are not evenly distributed across the world. For instance India houses 16% of the world's population but has access to only 2% of the global water resources. Within India itself the water resources are not evenly spread. The irony is that in India there are occurrences of drought and floods simultaneously in the country. If only there was a way to divert the water from flood-prone regions to the water-starved regions in the country.

The interlinking of water projects by channeling from the surplus region to the needy areas will absorb the perennial danger of floods and droughts and thus effectively harness the natural available resource. The concept of transferring water from one basin to another is not new but small solutions closer to the users would yield quick results and would be a first step in taking up the linking of major rivers. This document mainly deals with the issue of river linkages within a large Tapi drainage area and augmentation of ground water storage through recharge of flood water into a hydro-geological formation.
Background

India with a geographical area of 3.3 million hectares is the one of the country which embraces wettest as well as driest climate zones. The Cherapunji in North-east gets highest (15000mm) annual rain fall and Jaisalmer, West Rajasthan gets the least annual rain fall (100 mm). The total precipitation for the country as a whole is about 400 million hectare meters with an annual average rain fall of 1100 mm. The anticipated utilization by 2025 is 92% for irrigation and 8% for domestic and industry. According to United Nations study the availability of fresh water in Asia is about 3000 cubic meters per capita per year. In India the corresponding figure is about 2500 cubic meter per capita per year. It is anticipated that that the availability of water per capita per year in the year 2025 would be about 1000 cubic meters. In order to overcome this handicap, the Indian national river linking plan has the following goal in interlinking of north and south rivers. In Tapi basin availability of water per capita at present is 1000 cu. m only. The interlinking of river basins would be effective in tackling drought of the country thus eliminating the water stress amongst its users. The food production would be increased by irrigating the total irrigable area year marked successively. Problems of drinking water and irrigation of dry land will increase along with rise in groundwater levels the interlinking would mitigate the floods and the subsequent hazard.

About Maharashtra

Maharashtra covers about 30.7 million hectares of land and lies on the western side of peninsular India between 16° and 21° north latitudes. It is the third largest state in India both by area and population. Out of total population of more than 80 million, about 30 million is urban population. The main river system in the state is Godavari, Krishna, and Tapi. The state can be divided in to three natural regions viz.: coastal strip, east flowing Godavari and Krishna river region and west flowing Tapi river region.

Unlike the Gangetic basin of north India where perennial flows are available in river, Maharashtra topography requires the construction of dams for storing water during monsoon when abundant water is available and to use the same during fair weather. The state receives monsoon rainfall varying in its annual intensity from 6000 mm in Western Ghats to 500 mm in central region of Maharashtra. The number of rainy days varies from 30 to 40 in central region to 75 to 85 in coastal region of the state.
Most of the rivers in Maharashtra dry up by January or February. Therefore unlike in northern India where only, diversion works are predominantly constructed, storage of water is necessary for the development of water resources in Maharashtra.

### About Jalgaon

Jalgaon District is located in the north-west region of the state of Maharashtra. It is bounded by Satpuda mountain ranges in the north, Ajanta mountain ranges in the south. Jalgaon is rich in volcanic soil which is well suited for cotton production. It is a major business centre for gold, pulses, cotton and bananas. Languages spoken are Marathi, Ahirani, Hindi, and English. Jalgaon District receives an average rainfall of about 690 mm and the temperature varies from 10-48 degree Celsius.

Jalgaon is one of the 35-odd districts in the western Indian state of Maharashtra. The district hosts a population of about 4 million in an area of about 11,700 sq km. It is abounded by many religious places and cultural establishments. The World famous Heritage site Ajanta Caves is near to Jalgaon (50 km) making it as one of major International Tourist hubs. Jalgaon is rich in volcanic soil which is well suited for cotton production. It produces 16% India's banana production and consequently 3% of world's total.

The principal natural feature is the Tapti River. Unlike the rest of the Deccan, whose rivers rise in the Western Ghats and flow eastward to the Bay of Bengal, the Tapti flows westward from headwaters in eastern Maharashtra to empty into the Arabian Sea. The Tapti receives thirteen principal tributaries in its course through Khandesh region. None of the rivers is navigable, and the Tapti flows in a deep bed which historically made it difficult to use for irrigation.

### Geography of the region

Tapi enters in the district at RL 220 m. and leaves it at about 150 MSL. It is a main drainage and all of its tributaries and sub-tributaries draining finally into it. On the right bank it receives 29 tributaries and on left bank it receives 11 tributaries, draining directly into it. The mountain front is almost a geological fault running parallel to Satpuda and Tapi river followed by a highly previous Bazda zone.
On left of Tapi it receives three major tributaries like Bori, Girna and Waghur. Girna dam is placed at RL 400 at south west corner of district having its own distribution system as shown in the plate it is to be connected to every ridge and reservoir of the district on the left side by constructing canals, tunnels etc. It is planned so that canal running parallel to Ajanta hills at almost mountain front. It will flow from West to East and on north - south ridge. Some part of these canals will have zero gradient wherever required to have flow in both the directions to divert surplus water from to deficient zones. So Bori river, ridge between Girna & Bori, Girna river, a ridge between Girna and Waghur, Waghur river and ridge between Waghur and Bhogawati will be well covered and will boost ecology, flora and fauna of the area. The total area is almost a drought prone area, a rain shadow area also and having scanty rainfall pattern.

- **Jalgaon River Linking Project - The Turning Point**

The Jalgaon district was unfortunate to receive scanty rains while most of Maharashtra was experiencing flood-like situations. The Jalgaon district had received less than average rainfall, i.e., only 15% by mid-July and 73% by end-October 2005, and that too in unequal measures. Seven tehsils of Jalgaon district were in particular largely affected. There was no run-off water in the rivers and nalas; consequently, all water reservoirs were empty and ground water level was depleting while in the neighboring Nashik district, the Girna dam was overflowing. So this excess water from the Girna dam, which was otherwise going waste, had the potential of being diverted to the water-scarce regions of Jalgaon.

The diversion of the surplus water from one region to the needy areas will avert the perennial danger of floods and thus effectively harness the natural resources available.
The concept of transferring water from one basin to another is not new, but minor solutions closer to the users would yield quick results without many hurdles and would constitute the first step in taking up major river-linking initiatives. There are a number of schemes for water conservation -- DPAP, IWDP, NREGS, SGRY, etc., but such water conservation -- "khet ka paani khet mein aur gaon ka paani gaon mein" -- is possible only in places which receive substantial rainfall. Today rains are very erratic, some places receiving extremely heavy and other places receiving no rainfall. For rain-deprived areas, the only feasible option is to divert water to them from areas of excess rains by way of the river-linking technique. In fact, the work of water conservation and river connectivity should proceed simultaneously through watershed development.

- **Project Objective**

Providing water for drinking as well as irrigation purposes in the drought-hit areas of Jalgaon district by using diverted excess overflowing water, by adopting the "River Linking Technique"

The less than adequate rainfall in the seven tehsils was likely to create drought-like conditions. To overcome this problem and provide water for drinking purposes, usually in times of scarcity, new borewells are dug, temporary water supply schemes (TPWS) or existing water supply schemes are used or as a last measure, tankers deployed. But such an approach involves expenditure of crores.
of rupees every year. Moreover, this expenditure does not create any permanent asset. The option of providing water tankers to tackle scarcity is also not sustainable. Often planning is supply-driven rather than demand-based; this drawback was attempted to be addressed through the Jalgaon River Linking Project.

**River Linking Technique**

This river linking project in Maharashtra, India, is based on innovative methods of linking of natural and artificial water drainage for inter-basin and intra-basin water transfer. This is a unique technique of rain water conservation; utilization of flood water run-off and replenishing natural and artificial water bodies through natural and artificial water drainage channels. The excess water in a river is utilized to recharge the ground water bodies and dry wells in its command areas. The project is designed for the optimum utilization of rainfall-runoff for inter-basin and intra-basin water transfer through innovative technologies of both surface water transfer and ground water recharge. The principle of watershed management within the command area is used not only for agriculture purposes, but also for drinking water and industrial purposes.

**The basic objectives of the river connectivity initiative are to:**

1. Divert the water in arid and semi-arid parts of the district from water surplus areas
2. Increase the efficiency of different water storage structures
3. Conserve the water by taking it through canals ducts, drains, nallahs, natural drains etc. in the drought - prone areas
4. Identify the inter-relationships of recharge areas with geology, geomorphology, soils and the structure of the area
5. Detect land use changes and correlate them with changes in the area of connectivity over the years
6. Carry out qualitative and quantitative assessment of water resource
7. Suggest suitable sites and methods for artificial recharge to augment ground water recharge in the area.
8. Establish and evaluate long-term research on monitoring, measuring and planning for sustainable development in the area under benefit
9. Assess and model the socio-economic impact of the river connectivity initiative
The District is mainly drained by major river Tapi, with tributaries Bhokar, Suki, Hadkai, Ratnawati, Aner, Waghur, Agnavati, Titur, Manyad, Bori and Anjani. (Plate) Tapi River originates near Multai in Baitul district of Madhyapradesh state at an altitude of about 762 meters. It is a west flowing river runs initially along the hilly and forest tract of Madhya pradesh, with a drainage area of about 15 % (9634 Sq.km) of total 64745 sq.km. Out of 724 km, total length from its origin to destiny at Arabian sea, the Tapi river flows for about 340 kms, along dense forest and further 228 km in Jalgaon and Dhule districts of Maharashtra with about 79.16 % (51254 Sq.km) of its drainage area in Maharashtra, before entering in to Gujarat state across Western Ghats. The main water storage systems in the district are Girna Dam Hatnur Barrage Manyad Bori, Bhokar Suki Abhora, Hivra Agnavati, Tondapur, Mangrul & Bahula medium projects.

It is observed that the Hatnur barrage storage has been diminishing due to the accumulation of silt. Though high inflows are observed at the Hatnur barrage site, due to less storage space, the same is discharged untapped. This has resulted reduction in the use of surface water and thus the economic status of irrigators in the region and to go for alternate means. The only avenue left with the irrigators is pumping more water from ground water storage. The data collected from the area shows a predominant increase in the number of wells year to year. This has also resulted in increased reliance on ground water storage than the surface water thus defeating the conjunctive use of ground and surface water.
Due to dependency on power for pumping of ground water and the existence of wide power crisis, the timely supply of irrigation water to the crops also has been affected thus reducing the overall irrigation efficiency of the region as a whole. It would also lead to social unrest if ground water storage gets depleted and finally disappeared due to heavy withdrawals. The economic status of farmers who are growing Banana crop to the extent of about three quarter of the state 2 quarters of country requirement is also getting adversely impacted due to lower yield and high irrigation cost.

The recharging of the region would not only provide to the region an economic boost but also replete the ground water storage. It would also provide a social impetus by assured supply of ground water to the irrigators and municipal users who have less support from the surface storages.

The study of meteorological phenomena it is noticed that trend of monsoon rain fall is diminishing year to year towards Vidarbha region. Thus the tail end Purna river regime flow is reducing progressively. This has resulted accelerated withdrawal of ground water storage, in this region for Irrigation and municipal use. As the geo-hydrological fault a characteristic continues in this region also, giving scope for recharging, the recharging of flood water through flood canal in this regime would provide benefits to the human and live stock considerably. Moreover because of heavy withdrawals chances of subsidence can be avoided.

In order to augment water supply for agriculture and municipal and industrial uses, Government of Maharashtra has left no stone unturned in tapping the rain water by taking up the construction of many storage dams stated as above. However due to peculiar nature of Tapi river basin and its geographical terrain locations and un-even spatial ditribution of monsoon rain fall over the drainage and a noticed relative shift and periodicity in occurrence of rainfall within the sub catchments, it is observed that large quantum of river flows during monsoon from some storages, in the form of flood has been left un-tapped thus resulting many of the storage dams not attaining their planned conservative storage levels. It is therefore felt appropriate to undertake linking the conducive river sub-valley storages within a large basin as a first step to implement the national river linking plan.

Due to a typical hydro geological and geographical pattern in this river regime, the drainage pattern houses many storages (105 nos.) on left side of Tapi River with limiting scope of good storage sites on its right side. However nature may not leave any of its portion deprived of water.
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This may be the cause for the existence of a major geological fault on Tapi river right & left side. Alluvial deposits in Tapi and its Tributary Purna river basins fault, with un-consolidated sediments, occurring in parts of Jalgaon, Dhule and Nandurbar districts. Extension of the fault zone is also observed in the neighboring districts of Amravati, Akola and Buldana of Maharashtra state and Khandwa and Buharnpur districts of Madyapradesh state.

It is therefore felt appropriate to evaluate the efficacy of filling the empty spaces in this fault zone, which can house abundant ground water potential. It is also noticed if such an action plan is under taken it would augment the ground water storage at this region which is getting depleted at an alarming rate of 0.4 to 1 meter per year. It will link river Tapi to its 29 tributories on right side & tributories on left side draining into Tapi. It will connect Tapi to 20 tributories draining into Purna river. Accordingly detailed survey and investigations were carried out to understand the efficiency of recharge structure and its impact on ground water regime. The area benefited from artificial recharge and cost economics with additional land which can be brought under irrigation was assessed by the Central Ground Water Board, under Federal Government. Accordingly recharging the flood water of Tapi river during monsoon through an artificially constructed flood canals were finalized by the authorities.

As the distribution and occurrence of monsoon rainfall is not uniform, the storages which have been planned on left side of River Tapi, have been deprived to serve the purpose for which they
haven built. It is observed from the recent past that the Girna storage which accommodates 608.81 million cubic meter of water, at its conservative storage level of 398.07 metre (m) is attaining full capacity though in the past, rarely reached. Similarly it is also observed that the Manyad storage basin would not receive enough rainfall when the Girna storage attains its full capacity. This shows a significant aberration in the meteorological happenings in the occurrence and distribution of rainfall over Manyad and Girna river adjacent sub-basins. Identical pattern of occurrence and distribution of monsoon rainfall has been noticed between Bori and Girna sub-basins.

The drainage pattern of river Tapi on its left shoulder, below Purna river confluence, is rectangular, mainly accommodating Girna, Bori, Waghur sub-basins. There exists a localized and typical sub-basins altitude pattern consisting of undulating strips making distinctive compartments for the overland flows. The rectangular type basin said earlier is in the form of an oblique tray having natural rivulets with moderate to normal bed slope. As one travels from Girna sub-basin towards north, the orographical rainfall pattern also increases. However there are some pockets in between where the rainfall magnitude varies from average to low. There is also some storage tanks have been built in this region which may not attain the planned storage capacities frequently.

In such scenario, it is observed that only some of the 132 storages spill surplus water but some storages have been deprived of attaining their designed capacity in full, within the major river basin. This has generated a water stress and disharmony amongst the neighborhood population and live stock.

In order to ease and provide some relief to the sufferers, government undertook supplying municipal water to such areas through tankers but such an action was not adequate for providing a permanent type relief.

Therefore a detailed survey was undertaken to locate such water scarce areas. It was felt that if a conveyance system is provided from the areas where water is available in excess to the areas where water is needed due to scarcity, a solution is possible. Accordingly as a first step, a linkage between Girna Panzan Left bank canal and Bori storage was undertaken and successfully completed. Similarly some more links between two storages established. In order to convey water from the areas of excess availability to the areas of shortfall a zero gradient canal was also
proposed. This canal proposed to function as a temporary platform for feeding the water to the water scarce areas through the natural rivulets.

As the typical basin geographical and orographical characteristics of this drainage system, do not facilitate to the even occurrence of rainfall thus it is observed that the variations of rain fall at two pockets with in the basin is considerable. In addition the drainage properties do not facilitate to decelerate flood water by good storativity but accelerate the floodwater in a quick release. This has resulted occurrence of flash floods events in succession. Due to limited storage space all the surplus water finds their way in the river channel left un-tapped.

The inter river valley storages connectivity thus permit to conserve wasteful surplus water by diverting from one storage of surplus to the other neighborhood storage where deficiency of water has been foreseen. A detailed analysis of deficient and sufficient but excess inflow storages have been recognized and as a first step two such links have been established.

The connectivity of intra river basin storages has given a social impetus in such region. It has also reduced the government recurring expenditure by dispensing with the water supply to the water scarcity areas by tankers. Assured surface water started to appear in once dried river channel which has given a boost to the population and live stock in such region. This has also provided a confidence to those who are permanent settlers in the region to go for new ventures like renewed and modern agriculture systems to grow cash crops.

The valley storage linkages would certainly ensure more productivity in the region, as the water is diverted from the areas where it is available in surplus to the areas where it is scarce. The river regime would be developed as assured water availability can be foreseen once the recharging of flood water and linking of valley storages with in the basin is completed. Tapi river which is almost dry from the end of January can be rejuvenated and get a new look once the recharging of ground water storage through flood canal is complete and once ground water starts to seep in to the river.
Project Duration

This project was conceptualised, planned and executed over a period of three-four months in 2005.

Strategies Adopted

The problem of drinking water became very grave and acute in 2005. There were possibilities of loss of Kharif crops too. It was decided that the excess water in the Girnad dam would be diverted to the water-scarce regions in the Jalgaon district by interlinking various rivers.

Participatory Approach in Planning

The citizens were involved in the planning. Taking suggestions from local villagers and assessing their technical feasibility was an integral component of the project. The local villagers willingly parted with parts of their land to enable the inter-linking of rivers. The fact that not a single voice was raised in opposition to the project is a testimony to the success of the participatory approach in planning.

Interlinking to be developed using existing natural drainage systems and canals

It was strategised that existing canals were to be used to the maximum extent possible. These canals were repaired and their capacities enhanced by desilting and raising embankment heights. The existing natural big drains, riverbeds and channels were also used to a large extent and also additional canals and channels were dug wherever required.
**Use of gravity rather than pumping for diversion of water**

The project was planned in such a manner that the natural contours and gravity would be fully utilized in the diversion of water. This was critical not only to keep costs and maintenance low and but also to impart sustainability to the project.
Solved the drinking water problem for a population of about 8.5 lakhs. The project provided tangible and immediate benefit to the local people: It solved drinking water problems of one municipal corporation, five municipal councils and 123 villages. The population that benefited from this project numbered about 8.5 lakhs.

Resulted in additional storage capacity of 4,886 Mcft of water valued at Rs.11 crores
This river linking project resulted in additional storage of about 4,486 mcft (million cubic feet) water in the district. The value of this additional water made available is about Rs.11 crores. In total, around 700 medium, small dams, K.T. weir, village tanks and percolation tanks were filled and more than 16,000 water wells were recharged because of this river connectivity project.

Irrigated area increased from 13,000 hectares in 2005 to 30,000 hectares in 2008
The river-linking project helped increase the area under irrigation from 13,000 hectares (Ha) in 2005 to 30,000 Ha in 2008. Total estimated benefits received by agriculturists ranged between Rs.25-30 crores annually.
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Figure 1 - Area under Irrigation before and after River Linking Project

- Did away with the need for water supply by tankers in areas hit by water scarcity
- The increased water availability for drinking purposes has done away with the need for tanker water supply, implying a savings of about Rs.9 crores per annum.

Figure - River Linking Project Impact

Bori Medium Project
Before

Reduced dependence on rainfall
Reduced dependence on rainfall. This has also resulted in an increase in the water table in some tehsils despite receiving 35%-45% less than average rainfall. This has been endorsed by GS~DA (Ground Water Survey Development Agency), an agency of the Government of Maharashtra in its report.
Findings of a Socio-Economic Survey conducted by JalaSRI in 2007

The benefits and after-effects of the Jalgaon River Linking Project have been validated through an independent socio-economic survey by a third party agency. This survey has been conducted in 2007, two years after the project's implementation. The findings prove that the project is not only successful, but also sustainable; its benefits are still being enjoyed by the people of Jalgaon. The project has been positively received by all sections of society. This survey was conducted by the renowned organisation JalaSRI, a Watershed Surveillance and Research Institute at Jalgaon (Maharashtra, India) funded by National Science Foundation (NSF) Program on Digital Government Research and Development of USA.

The survey was scientifically conducted, based on random sampling. JalaSRI conducted a socio-economic survey of 840 households belonging to 42 villages. These households were randomly selected out of 300 villages in the region and spread over eight tehsils out of the fifteen tehsils of the Jalgaon District in September 2007.
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- Eighty-one percent of the households surveyed are engaged in farming and 5% are agricultural workers. 52.8% households have incomes ranging between Rs. 10,000 to Rs. 25,000 per month. 25.59 % of the houses are made up of mud and 23.80 % have been constructed using cement.

- 84.52 % are in favour of the river linking efforts.

- 53.92% farmers have noticed considerable rise in water levels of their wells.

- 64.64% people have positive approach towards the Government agency.

- 26.15% households reported their active participation in the execution of the links contributing to 2142 non-working days.

- 42.2% people reported increase in their employment opportunities.

- 57% people reported receipt of adequate drinking water.

- 50% of the people are well aware of the river linking project and have positive opinion about the river linking project.
Resource Convergence technical and financial

There are various channels through which the Government can spend money for the welfare of its citizens. Often the money spent does not attempt to bring in synergies by aligning complementary spending. For instance, in the case of Jalgaon, the following sources of funding can be tapped.

<table>
<thead>
<tr>
<th>Department</th>
<th>Source / Purpose of expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jalgaon Collectorate</td>
<td>Funds allotted to tackle problems in times of water scarcity</td>
</tr>
<tr>
<td>Irrigation Department</td>
<td>Building of dams - minor and major and survey, repair &amp; maintenance of dams and canals</td>
</tr>
<tr>
<td>Municipal Corporation / Councils</td>
<td>Internal resources for augmenting water availability for drinking</td>
</tr>
<tr>
<td>MP / MLA Local Area Development Scheme</td>
<td>For various development works within their respective jurisdiction</td>
</tr>
</tbody>
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Each of the stakeholders identified above could jointly address the issue of water and river-linking in Jalgaon. The Irrigation Department agreed to fund the initial project survey cost and provided technical assistance in making the project a reality.

1. The Government of Maharashtra's high-powered committee was convinced to allocate Rs. 2 crores from the scarcity fund for a novel river-linking project.
2. Funding was also made available from the MPLADS and MLALADS schemes and support from various Municipal Councils was also available.

The involvement of these stakeholders meant that a strong platform was created for support to be generated from a wider audience. This project is a fine example of several different departments working together and pooling their respective strengths to achieve a common objective -- tackling water scarcity and providing water for irrigation and other various purposes. This had improved the living conditions and socio-economic status of the people of Jalgaon.
This integrated approach to project planning and execution would not have been possible without the vision and perseverance of the then Collector & DM of Jalgaon.
Zero Land Acquisition Cost
The involvement of the citizens in the planning process allowed the potential benefits of the project to be disseminated among the people at large. The citizens were willing partners in the project. They readily partied with parts of their land to make the project possible. In the process, they enhanced the commercial value of their land which earlier was considered barren. The availability of water for irrigation on account of diversion of water resulted in the land becoming productive. Further, the local people also participated in the project by being physically involved in the river-linking works. The monetary value of the local people's contribution parting with their land and providing labour -- would have far exceeded the government contribution of Rs.2 crores.

Figure - Recurring Benefits in excess of Rs. 45 crores annually

The project has not only addressed the area's water requirements but also the employment issue as it helped in providing employment in the district and thus improved its economic profile.
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Key Development, Implementation Steps And The Chronology

Analysis of the problem situation The District Administration assessment of the water scarcity in certain parts and flood like situations in other parts and the traditional administrative response gave birth to the need to provide a lasting solution to this problem. It was identified by the District Collector.

Conceptualisation of the solution
The District Administrator being technically qualified floated the idea of using natural channels to inter-link rivers thereby diverting excess water from flood prone areas to areas which were drought hit was conceptualised.

Field level assessment
The District Administrator made an extensive field level assessment of the possibility of interlinking of rivers. The district administrator along with his team undertook numerous tours to magnitude of the task that they faced in giving shape to their project concept.

Discussions with local people
All along the field level assessment the team made it a point to interact with the local population to bounce off ideas and take their suggestions for translating this project into reality.
Field Survey
This was followed by an extensive survey by the officials of the Irrigation Department. The survey allowed the project to take shape and identified further areas of investigation.

Funding from elected officials for Project Development Report
At this point of time, the team required financial support for preparing the Project Development Report. Also, the district administrator realised getting support from the political class was important for sustaining the project and making it a reality. The elected members of the region were made aware of the project potential. The preliminary findings were shared with them and the roadmap for making the project a reality was provided.
They agreed to fund the project development expenditure through the grants available with them for undertaking developmental works in their respective constituencies.

Project Proposal Prepared
A project report was prepared which also included a cost benefit analysis. The project emphasised the use of natural channels and minimum construction works for the inter-linking of rivers. The issues of sustainability and keeping project operating costs low through intelligent design were kept as the guiding principles for preparing the project.

Submission of Proposal to Government
The proposal was then submitted to the government with the merits being extensively discussed with the project. Once the government was convinced, the District Administrator highlighted the importance of the project and the urgency with which it needed to be implemented. The cost of undertaking the water scarcity measures were higher than the cost of implementing the project; this project provided a lasting solution. This was the clincher for the State Government using a separate budget head (scarcity budget) to be utilised for inter-linking of rivers.

Project completion
The project was completed right from conception to completion in four-five months with full support from the members of the local community.
Innovativeness

The innovativeness of the project was in its being a demand driven project. It is common to observe unequal rainfall in Jalgaon district. In 2005 also, some districts of Jalgaon experienced drought like conditions while some parts were experiencing flood like situations. The Collector Jalgaon sensing an opportunity in this paradoxical situation conceptualized a project which diverted the water in the flood areas to the areas which were affected by drought like conditions. This thought process was novel in the Public Administration of Jalgaon. The usual response to water scarcity is to launch of temporary water supply schemes. But this does not a provide a sustainable solution to the problem. The diversion of surplus water to water stressed areas is one sustainable solution.

This project had another first to its credit resource convergence. The Irrigation Department is responsible for construction of dams, canals, ponds and other water storage structures. The Collector’s office role comes into play when there is water scarcity in the area. But there is no institution to look after equitable distribution of water and prevent the occurrence of water scarcity situations. The Collector of Jalgaon district was instrumental in marshalling the resources of the Irrigation department and other Government departments/agencies Collector’s office, Municipal Corporation and State Government - in providing a lasting solution to the problem of inequitable water distribution in the district.
The Collector was able to take an integrated approach to development. The conventional approach would have been to use Government budget to spend crores of rupees on instituting temporary water supply schemes. The irrigation department would not have been involved in tackling the water scarcity problem, as it was not its mandate. But the end objective of Public Administration should be to provide water both for irrigation and drinking water purposes. The Collector of Jalgaon saw a commonality in purpose—diversion of water to meet both irrigation and drinking water requirements. It is on this platform of solving both the problems, the Collector was able to get two disjoint Government Agencies/Departments under the common umbrella of solving the water problem—drinking water and irrigation in Jalgaon district. It is this commonality of purpose which allowed the State Government to sanction funds for a river-linking project under the Scarcity Head—another first for the project.

**Main Obstacles Encountered**

The solution to the problem in Jalgaon lay in achieving equitable distribution of water in the region—a mandate none of the agencies had. The Irrigation Department is responsible for construction of dams, canals, ponds and other water storage structures. The Collector’s office role comes into play when there is water scarcity in the area. But there is no institution to look after equitable distribution of water and prevent the occurrence of water scarcity situations. There was a need to fill the institutional vacuum for the project to go ahead.

Under the leadership of the then Collector of Jalgaon, the District Administration took the responsibility of co-ordinating the multiple agencies and developing integrated strategy to implement the initiative.

The District Administration’s traditional response to problems of water scarcity was to spend millions of rupees in creating temporary water supply schemes, providing tankers etc. These schemes would probably meet the requirement of the time but would not provide a lasting solution. So the innovative idea of River Linking required overcoming organisational inertia is attempting something new. However continuous discussions with the Irrigation Department on the feasibility of the idea and initial stakeholder reactions provided the much required encouragement to the District Administration to pursue the idea forward.

But the challenge was getting funding for the project. There was no provision in the State Government budget for a river-linking expenditure. However, the District Collector positioned
the project as addressing the water scarcity issue through the inter-linkages of rivers. It was for the first time that inter-linking of rivers was funded out of the scarcity fund.

The second challenge was in involving the biggest stakeholders and more particularly the land-owners whose land will get affected on account of developing the inter-linkages of the rivers. The stakeholder consultation at the conceptualisation stage of the project allowed all the concerns of the stakeholders to be taken into account. The landowners affected by the project became willing partners in the project as parting a part of their land would allow the remaining part of the land to be arable on account of availability of water for irrigation.

Public sector projects however well-intentioned face hurdles from different sections stakeholder community. In anticipation of possibility of any such eventuality, the District Administration took the proactive initiative of involving also the elected officials from the region to broad-base the stakeholder support. The merit of the suggestions in the proposed initiative meant that there was unanimity of support. The support also took the form of financial assistance to the project that the elected officials had access through the Local Area Development schemes.

The members of the political class also provided the necessary support for the execution of the initiative planned by the District Administration. Thus launch of the initiative supported by a wide range of stakeholders each taking ownership of the project, allowed the project to be completed within four months.

**Replicability**

Adequate drinking water and water for irrigation are major issues in many parts of the state. Though the initiative undertaken by the Jalgaon collectorate is specific to the prevalent watershed area and topography of the district, this technical experience could be used as a model for replication in other parts of the state and the country. The Maharashtra State Government has recognized the immense potential of projects and accordingly issued a Govt. resolution to implement projects in every district along the lines of the Jalgaon River Linking Project. The success of this initiative has encouraged Government/districts to make allocations for such projects every year in the budget as parts of a regular planned scheme.
The Government of India has also taken the decision to implement river linking but it has not yet implemented this decision fully because of various reasons. No of problems are also to be encountered while implementing this i.e., land acquisition, environmental, social and legal issues etc. If these kind of small projects are implemented considering one, two or few districts as a unit depending upon various technical factors i.e. alignment, topography, natural drainage networks etc, much better results can be achieved as the project will then be both cost-effective and citizen-friendly. The experience of Jalgaon shows that land acquisition will not be a great problem and also we can use local technical know-how and their expertise.

**Project Sustainable And Transferable**

The initiative has continued to yield benefit beyond the year of execution:

i. Even during years of scanty rainfall, the ground water table has not depleted considerably. The local population could utilise water from wells instead of depending on tanker water supply.

ii. The area under irrigation continues to expand as water availability in regions which hitherto were drought-prone. There is enhanced agricultural activity on account of this initiative.

A river linking project is considered fraught with possibility of ecological disasters. This project was conceptualized in a manner which was eco-friendly and sustainable:
i. Interlinking achieved using existing natural drainage systems and canals. It was strategised that existing canals were to be used to the maximum extent possible. These canals were repaired and their capacities enhanced by desilting and raising embankment heights. The existing natural big drains, riverbeds and channels were also used to a large extent and also additional canals and channels were dug wherever required.

![Image: Carrying capacity of existing canals increased by raising bank height - these canals were then used for linking various rivers]

**Use of gravity rather than pumping for diversion of water**

ii. The project was planned in such a manner that the natural contours and gravity would be fully utilized in the diversion of water. This was critical not only to keep costs and maintenance low and but also to impart sustainability to the project.

The management of the ecological risks and sustainability of the initiative on account of appropriate design that has demonstrated the power of low-cost but sensible innovations in yielding dramatic results. This is a project has become a perfect model for replication in several other parts of the country which experience similar problems.

Further, state government of Maharashtra has recognised the benefits of this project accrued to the local population and has urged all other district administrators in the state to explore such opportunities in their respective jurisdictions. In order to make
government funding more accessible, there are special funds earmarked in the State budget which will allow other districts to meet their financial requirement for such river-linking projects.

Buoyed by the success of this project, the Department of Administrative Reforms in the Ministry of Personnel, Government of India has identified this project as a model project and a success of Public Administration. Case notes on this initiative will be circulated to all Chief Secretaries and other relevant officials of all the States in the country.

All this points to the fact that there is wide acclaim for this project and there are possibilities of such initiatives getting replicated in other parts of the country. The State level and national level recognition to the project has created the much-needed enthusiasm for such low cost initiatives but most effective public utility projects in the country.

The District Collector has been invited in national and international forums (at USA, Australia, China) as a case study for a successful river-linking project without doing any harm to environment but on the contrary being in harmony with the environment.
Role of Collector

Thinking Out of the Box

The situation of uneven rainfall and water scarcity in Jalgaon district was not a novel one. The usual response to such situations would have been to resort to tanker supply to the affected villages in the region and the acceleration of water supply schemes under implementation in the district. Such remedial measures may solve the problem of water scarcity but would not provide a sustainable solution. It is to the credit of the Collector for an 'out-of-the-box' solution to the water problem in Jalgaon. The river-linking project was not only completed in record time but also has solved the water problem in the district in times of water scarcity. The Collector has not only displayed the vision but also led a multi-agency team in getting the project implemented.

Converging diverse interests of different agencies towards the welfare of people of Jalgaon The Collector has not only achieved inter-linking of rivers but also linked the diverse interests of all stakeholders. He has been instrumental in marshalling the resources from the Irrigation Department, State Government and MP/MLA LADS. The transparency in the planning process and stakeholder consultations allowed the project to gain wider acceptance. The people willingly gave part of their land wherever required and with the anticipation the river linking project will enhance the value of their un-parted land.

Diligence in planning and focusing on sustainability allowed the project to avoid the ecological disaster that river-linking projects are associated with

The Collector used his technical qualification is conceptualizing the project. His emphasis on using the natural drainage channels, expanding the carrying capacity of the existing canals and with minimum digging of new canals has allowed the project to accrue benefits to the people in the region even after three years of project execution. This project has thus destroyed the myth that river-linking projects are ecological disasters. The success of such projects can potentially re-open the chapter on the national river-linking project. This project has highlighted the emphasis on bottom-up planning and building on successes of minor projects such as this which will eventually emerge as links to a larger project.
Jalgaon River Linking Project
Demand-based Project Through Citizen's Participation

Project Recognition

- This project has Received "Prime Minister Award for Excellence in Administration".
- The Department of Administrative Reforms, Government of India has evaluated the project and identified it as MODEL PROJECT and one of the success stories of Indian public administration. The project details and achievements have been found worthy for dissemination to a wider audience. As per DARPG's directive, the Jalgaon River Linking project details are being documented and copies of this report (350 in all) are being sent to all Chief Secretaries and concerned departments of all States and Union Territories, Parliament House Libraries and 28 Administrative Training Institutes in the country.
- The project outcomes have been appreciated by H.E. Smt. Pratibha Devisingh Patil, President of India and Hon'ble Minister for Agriculture, Shri Sharad Pawar and other diginitaries.
- The then Chief Minister of Maharashtra Hon'ble Shri Vilasrao Deshmukh impressed by this novel project and such projects need to be implemented in every district in the state and accordingly issued a Govt. resolution to implement projects in every district along the lines of the Jalgaon River Linking Project. Maharashtra Government also sanctioned a river linking project as regular scheme in District Planning Committee (DPC) to meet out the financial expenditure for all the districts.
- The then District Collector, Jalgaon had been called by the then Chief Minister of Rajasthan, Hon'ble Smt. Vasundhara Raje Scindia to share his experience in implementing the project and what learning it can have for the state of Rajasthan.
- The then District Collector, Jalgaon was also invited by Australian government to present the Jalgaon River Linking Project at the 9th International River Symposium 2006 held at Brisbane, Australia. The symposium allowed the project details and experience to be shared with about 550 delegates over 50 countries.
- The then District Collector, Jalgaon also presented the river linking project details at an International Conference in China in 2007.
- The then District Collector, Jalgaon also participated in the meetings and discussions on digital governance and hotspot geoinformatics and presented Jalgaon River Linking Project at State University of New York, Albany, USA in October, 2009.
The Girna Major project is located on the border of the Nashik and Jalgaon districts. In 2005, Nashik district received heavy rains and the Girna dam was full around mid-July 2005. During that period, in the interest of flood management, 64,000 cusecs water was released in the Girna river from the Tapi river, and finally into the Arabian sea.

For regular irrigation purposes, the Girna project has Panzan left bank canal which flows towards Jalgaon district. The excess flood waters in the Panzan left bank canal were diverted and then the canal was breached at 31st km and water was diverted into a local nala, which flows and joins the Bori river by traveling a distance of 6 km by gravity. The Bori river flows 35 km towards the eastern side and reaches the Bori dam situated in the Jalgaon district. This way, water traveled 68 km. The capacity of the Bori dam is 1,400 mcft. After continuous efforts, some additional works on the canal and constant watch, 1100 mcft water was collected in the Bori dam. Water supply of the Parola town of the Jalgaon district and 73 villages was dependent on the water of the Bori dam. The water problems of Parola town and these villages were completely solved; so also the problems of 15 villages on the side of the Bori river were minimized.
II. Inter-linking of Girna and Anjani rivers

The overflowing water was released from the Girna dam into the Girna river and then into Jamada Weir, Jamada Left Canal and from here to Parola branch canal and then water was released in Anjani river and Kala bandhara. This way, water traveled 127 km. The problems of drinking water of Erandol town and other villages were solved.

III. Inter-linking of Girna and Titur rivers

The overflowing water was released from the Girna dam into the Girna river and then through the Jamada bandhara, diverted into the Jamda right canal. From this canal, the water passed into a brook and then successively into the Titur river, Hol Bandhara, Balad Bandhara, Wadgaon Bandhara and back again into the Titur river. This way, water traveled 84 km. Because of this skillful strategy, the problem of not only drinking water, but also irrigation water, was solved to a great extent.

IV. Filling of Bhokarbari and Mhaswa Project

The overflowing water was released from the Girna dam into the Girna river and then through the Jamada bandhara, water was diverted to the Jamada left canal which connected to the Parola branch canal; then the water reached the Mhaswa dam. From here, water was channelised to the Bhokarbari dam. This long journey of the water of 132 km has enriched the Bhokarbari and Mhaswa projects. Because of this skillful strategy, the problem of not only drinking water, but also irrigation water was solved to a great extent. The mechanism of the inter-linking is shown in a map.

V. Filling of Pimpri bandhara

Water was released from the Girna dam into the Girna river and then into the Jamada bandhara, the Girna river and Dahigaon bandhara successively. From there, the water passed into the Lower Girna Canal and then through the brook, this water was channelised and released into the Anjani river and then stored in the Pimpri bandhara. In this last stage, the water traveled 186 km. Because of this skillful strategy, the problem of not only drinking water but also irrigation water was solved to a great extent.
PRIME MINISTER'S AWARD
for Excellence in Public Administration
for the year 2008-09
presented to
SHRI VIJAY SINGHAL, IAS
for his outstanding initiative
“River Linking Project,
Jalgaon, Maharashtra”

New Delhi
Date: 21 April, 2010

DR. MANMOHAN SINGH
Prime Minister of India
Save Water