

# IRRIGATION GROWTH IN INDIA – PROSPECTS, INITIATIVES AND CHALLENGES

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## ABSTRACT

India has taken up an ambitious goal to double the average incomes of agricultural households by the year 2022, the 75<sup>th</sup> year of her Independence. This mammoth task requiring a sharp accelerated annual growth of 10.41 per cent will need strong measures to harness all possible sources of growth in farmers' income within as well as outside agriculture sector.

Apart from other concerned Ministries/Departments, Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD&GR) has also taken multi-pronged measures to meet the challenges in respect of development and management of water resources to contribute to goal of doubling the farmers' income. This includes fast track completion of a large number of major and medium irrigation projects in the country, surface minor irrigation (MI) schemes and repair, renovation & restoration (RRR) of water bodies through the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY). This scheme has been launched with the aim of bringing concerned institutions under a common platform, so that a comprehensive and holistic view of the entire "water cycle" is taken into account and proper water budgeting is done for all sectors.

Apart from that, the Ministry is planning irrigation projects utilising ground water (GW) resources in a sustainable manner in 96 districts in the eastern and north-eastern part of the country where stage of development of GW is quite less. Also, scheme for bridging the gap between irrigation potential created and that being utilised in the country has been firmed up. Further, for increasing the irrigation beyond presently estimated ultimate potential of 140 million hectares (Mha), Ministry is planning projects to transfer water from the surplus river basins to ease the water shortages in western and southern India while mitigating the impacts of recurrent floods in the Eastern India. This could help in creating additional 35 Mha of irrigation potential besides generation of 35 MW of additional hydropower.

The paper highlights the above measures taken by MoWR, RD&GR to ensure that the goal of doubling farmers' income by the year 2022 is achieved. The selective cases of modernization and reforms through various intervention and the lessons learnt have also been discussed.

## KEYWORDS

Conservation; efficiency; interlinking; PMKSY; water management

## INTRODUCTION

At 181.95 Mha (MoA&FW, 2016), India holds the 2<sup>nd</sup> largest agricultural land in the world. India also is amongst the leading producers of wheat, rice, sugarcane, cotton, pulses, tea, and oilseeds. More than half of the country's population is dependent on agriculture as a source of its livelihood.

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Thus, there is no doubt that for India's economy to grow and achieve food security and rural employment, the agriculture sector needs a significant thrust. However this sector suffers from low productivity and its growth faces several impediments particularly non availability of dependable irrigation.

India has taken up an ambitious goal to double the average incomes of agricultural households by the year 2022, the 75<sup>th</sup> year of her Independence. This mammoth task requiring a sharply accelerated annual growth of 10.4 per cent (NITI, 2017) will need strong measures to harness all possible sources of growth in farmer's income within as well as outside agriculture sector. Prime focus will be required on augmentation of the existing water resources by development of additional sources of water or conservation of the existing resources through impounding more water in the existing water bodies and their conjunctive use. Efficient water management for sustainable development of the available surface and ground water resources and their optimal utilizations would be required to meet such challenges.

## **OVERVIEW OF IRRIGATION SECTOR IN INDIA**

The Ultimate Irrigation Potential (UIP) in India has been assessed as 140 Mha (CWC, 2013). As per National Perspective Plan of the Ministry, implementation of Inter Basin Water Transfer (IBWT) proposals may create additional potential of 35 Mha taking UIP to 175 Mha. Against this, the irrigation potential created (IPC) in the country is 112 Mha and the gross irrigated area is merely 93 Mha. This 19 Mha (16%) gap between IPC and irrigation potential utilised (IPU) needs to be plugged. (MoA&FW, 2016)

Out of this 19 Mha gap, about 13 Mha gap between IPC and IPU has been estimated through major and medium irrigation projects. The major causes of such gap are poor maintenance of canals system, lack of participatory management, changing land use pattern, deviation from originally envisaged cropping pattern, no/inadequate command area development, absence of field channels for last mile connectivity etc. Moreover, the efficiency of irrigation for surface and ground water presently stands at about 30-40% and 55-60% respectively. India can make significant gains in water availability by increasing efficiency across the board on irrigation measures.

Various measures are required to be taken to address the above challenges. Challenges of supply side solutions comprise creation of new channels for enhancing supply, achieving equitable distribution, meeting the needs of sustainable development etc. The challenges of demand side solution comprise creation of new technologies for reducing water demand, change in societal mind set about water use, initiating and enforcing water related structural reforms etc. Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD & GR) has taken multipronged measures to meet the challenges in respect of development and management of water resources. These measures are categorised as short term, medium term and long term targeted to be completed by the year 2020, 2025 and 2035 respectively.

Short term measures are being taken under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) which is an umbrella scheme with the aim to serve as a platform for convergence of investments in irrigation through comprehensive District and State irrigation plans. It envisages end-to-end solution in irrigation supply chain viz. water resources, distribution, and efficient application and extension services. The focus is on creation of additional irrigation potential, improving water use efficiency at farm level and bridging the gap between IPC and IPU through various schemes.

The medium term plan would target those projects which have been languishing for various reasons and are left out from the present scope of PMKSY. The completion of these projects

together with projects completed under short term plan will develop adequate water utilisation capacities needed for meeting demand of 2025. Further, interventions through watershed development projects and increasing micro irrigation facilities would supplement the efforts in this regard. During the period, implementation of some of the river interlinking projects is also envisaged.

The long term plan would target new projects, focussing on both surface and ground water management including interlinking of rivers project. New Water Utilisation capacity would be created from both surface and groundwater sources.

## **PRADHAN MANTRI KRISHI SINCHAYEE YOJANA (PMKSY)**

In a bid to enhance agricultural productivity by covering more area under irrigation and strengthening distribution networks in an integrated manner followed by its effective monitoring, Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD&GR) has taken multi-pronged measures to meet the challenges in respect of development and management of water resources. This includes fast track completion of a large number of major and medium irrigation projects, surface minor irrigation (MI) schemes and repair, renovation & restoration (RRR) of water bodies in the country through the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY).

### **PMKSY - A Brief**

Launched in 2015, this program is an amalgamation of existing components with an “output-driven” approach as an umbrella programme with four components envisioning increased irrigation potential through Accelerated Irrigation Benefit Programme (AIBP), create, strengthen and restore water sources and its distribution networks to maximize the utilization of created irrigation potential through Har Khet Ko Pani or Command Area Development and Water Management (CAD&WM), Repair, Renovation and Restoration (RRR) of Water Bodies, Surface Minor Irrigation (SMI) Scheme and Ground Water component to improve water use efficiency by promoting micro-irrigation (Per Drop More Crop) and effectively manage run-offs and soil and moisture conservation, ridge and drainage area treatment (Watershed Development).

The PMKSY was initially approved during 2015-16 for implementation across the country with an indicative outlay of Rs.50,000 crore in five years as given in the Table 1 below

TABLE - 1

<b>Projected physical target and indicative outlay (Govt of India share)</b>			
Component	Implementing Ministry	Physical Target (in Lha)	Financial outlay (in Rs. crores)
2015-2020			
AIBP	WR,RD&GR	7.50	11060
Har Khet Ko Pani	WR,RD&GR	21.00	9050
Per Drop, More Crop	Agriculture	100.00	16300
Watershed Development	Rural Development	11.50	13590
<b>Total</b>			<b>50000</b>

AIBP component of PMKSY focuses on major and medium irrigation projects that involve an area of more than 2000 hectares. For area less than that Har Khet Ko Pani component comes into play

which includes Surface Minor Irrigation (SMI), Repair, Renovation and Restoration (RRR) of Water Bodies and Ground Water Development. In other words, dams, canals, distribution networks up to outlet levels are taken care of by AIBP while works beyond outlets are covered under Har Khet Ko Pani to ensure every farm gets adequate water. The other two components of PMKSY – Per Drop More Crop (PDMC) and Watershed Development are implemented by Department of Agriculture Cooperation and Farmers Welfare and Department of Land Resources respectively.

### **Institutional Structure of PMKSY**

Flowing from the supervision of inter-ministerial National Steering Committee (NSC) chaired by the Prime Minister, PMKSY follows a “decentralized” three-tiered institutional structure with High Level Empowered Committee (HLEC) at the Central level, State Level Sanctioning Committee (SLSC) at the State level and District Level Implementation Committee (DLIC) at the district level besides dynamic involvement of stakeholders. There is also a provision of having two progressive farmers and one NGO as members of DLIC, a step that engenders public participation.

For effective knowledge management and to identify the gaps in irrigation infrastructure at the district level, District Irrigation Plans (DIPs) are prepared, which subsequently take form of State Irrigation Plans (SIPs).

### **Prioritization of Projects under PMKSY**

One of the major reasons for the projects to remain incomplete was inadequate provision of central and State share funds. As a result, large amount of funds spent on these projects were locked up and the benefits envisaged at the time of formulation of the projects could not be achieved. This was a cause for concern and initiative was required at the national level to remedy the situation.

In July, 2016, the proposal to complete 99 prioritized projects under AIBP including their CAD&WM works; by December, 2019 was approved by the Government. Total requirement of funds for completion of identified 99 projects is estimated at Rs.77,595 crore (Rs.48,546 crore for project works and Rs.29,049 crore for CAD&WM works) with Central Assistance (CA) of Rs.31,342 crore. Utilisation of 76.03 Lha of potential is expected with the completion of AIBP and CAD works of these projects.

### **Other fast-tracked projects under PMKSY**

Under PMKSY (AIBP), pending issues pertaining to other projects like Gosikhurd (ultimate potential – 2.5 Lha) in Maharashtra and Polavaram project (ultimate potential – 2.9 Lha) in Andhra Pradesh which were at a standstill have been streamlined in a bid to meet the deadlines.

Polavaram is a multi-purpose irrigation project which is under construction. The project has been on cards for almost 75 years. This is one of most vital project for meeting the water needs of the Andhra Pradesh. The project reservoir has live storage of 75.2 TMCs (Thousand Million Cubic feet) and gross storage of 194 TMCs thereby enabling irrigation of 23,20,000 acres (including stabilisation of existing irrigated lands). Polavaram will benefit all the 13 districts of A.P, directly and indirectly. The dam can help divert and utilise Godavari water to Krishna and other rivers and would make significant contribution in making the state drought-free. This mammoth project is likely to be completed by 2019.

Gosikhurd Irrigation Project also known as Indira Sagar Irrigation Project is one of the major irrigation projects in Godavari basin in Indian state of Maharashtra in the Bhandara district on the

river Wainganga. The project was launched in 7<sup>th</sup> Five Year Plan during 1984. It has been declared as National Irrigation Project by Government of India. The project is aimed to irrigate 2.5 lakh hectares of land. The project is designed to provide an annual irrigation to an area of 89,856 ha in Bhandara district, 19,481 ha in Nagpur district and 1,41,463 ha in Chandrapur district of drought prone Vidarbha region of Maharashtra.

### **Innovation/initiatives under PMKSY**

- The arrangement of funds for Central share/Assistance (CA) has been made through National Bank for Agriculture and Rural Development (NABARD) as per year-wise requirements which would be paid back in 15 years' time keeping a grace period of 3 years. Further, the State Governments, if required, may also borrow funds from NABARD for the State Share.
- In respect of State share, the Government has allowed NABARD to raise zero cost bonds, the interest of which shall be borne by the Central Government so that overall interest rate for State share comes to about 6% so as to make it attractive for the States and encourage them to raise requisite State share for early completion of projects.
- The progress of the projects in physical as well as financial terms is monitored through the field units of Central Water Commission. Further, one nodal officer for each of the 99 priority projects has been identified who would be updating the physical and financial progress of the project regularly in the MIS developed for this purpose.
- Monitoring through MIS system and third party is being carried out.
- Maximum use of pressurized pipe irrigation and micro irrigation wherever feasible would be adopted to increase efficiency and reduce land required to be acquired for the projects. It would also help in faster implementation of the projects. In Odisha & Maharashtra, land acquisition of 2970 ha & 2060 ha respectively has been avoided in distribution system by adopting underground Piped Distribution Network (PDN) and appx cost saving is Rs.1050 cr. Other States are also sensitized for adopting the same approach. Keeping in view of the experience, MoWR, RD & GR and Central Water Commission (CWC) have prepared the guidelines for planning and design of Piped Irrigation Network and circulated during July, 2017 to all the States for their guidance in planning PDN in their projects.
- *Pari-passu* i.e. side by side implementation of Command area development works in the commands of these projects is envisaged to ensure that the IPC could be utilized by the farmers. New Guidelines bringing focus on Participatory Irrigation Management (PIM) have been brought out. Further, transfer of control and management of irrigation system to the Water Users' Association (WUA) has been made necessary condition for the acceptance of CADWM completion.
- Importantly, the PMKSY (AIBP & CAD works of 99 projects) is physically monitored in parallel by Central Water Commission, NITI Aayog, NABARD etc. through MIS system for transparency and to ensure deadlines are met. MIS enables the implementers to compare the progress of the project on regular basis. During 2016-17, 245 monitoring visits have been made to various projects. Through MIS, the government can also easily identify the constraints affecting the progress of the project for their immediate rectification. Besides, the Ministry of Water Resources applies remote sensing techniques to monitor its projects. A drone survey for lower Dudhana project in Maharashtra is also being contemplated.

### **The results so far in PMKSY**

Since the launch of PMKSY, Rs.5635.66 crore has been released as Central Assistance under AIBP, Rs.2907.78 crore under Har Khet Ko Pani, Rs.3,547.40 crore under Per Drop More Crop (PDMC) and Rs.2959.55 crore under Watershed Development during 2015-16 and 2016-17. In addition to above, CA of Rs.2541 Crore has been released for Polavaram Project to PPA. In order to encourage States to take up the projects under PMKSY (AIBP & CAD works of 99 projects), funding mechanism through NABARD has been approved by the Government for both central and state share. NABARD has already released Rs.3334 crore in respect of State share up to March 2017.

The successful timely completion of AIBP component of 18 projects under PMKSY (AIBP) in June 2017 indicates that the present government is sparing no effort in realizing the twin objectives of rural prosperity and water conservation. In seven projects out of these 18, Command Area Development work is either complete (or) were inbuilt in AIBP component or not required. The hard work is yielding results. The completed projects span eight states including drought-prone Andhra Pradesh (1), Karnataka (1), Chhattisgarh (2), Madhya Pradesh (3), Maharashtra (4), Telangana (3) and Odisha (2) besides Punjab (2).

All 99 projects are expected to be completed by December 2019. About 60% of these 99 projects would benefit drought prone areas of the country. AIBP works of 33 more projects are likely to be completed by June 2018. These include 6 in Andhra Pradesh, 7 in Madhya Pradesh, 5 in Maharashtra, 6 in Telangana, 3 in Odisha, 2 each in Assam and Rajasthan and 1 each in J&K and Uttar Pradesh.

Har Khet Ko Pani, on the other hand, has given emphasis to participatory approach that is in line with the National Water Policy. The participatory approach focuses on engagement of beneficiaries – farmers - that helps immensely in the optimal upkeep of irrigation system and effective utilization of irrigation water. Not only does it build confidence in farmers, it eases the stress of operating and maintaining the assets created on farm by the government. This relationship building with farmers would also augur well to make successful the envisaged policy of reuse of treated municipal and industrial water for irrigation. Steps to strengthen Water Users' Associations are also being taken as part of Har Khet Ko Pani under the aegis of PMKSY.

With PMKSY, the government has gone a step ahead by not only focusing on bringing more area under irrigation and maximizing the utilization of created irrigation potential but also inculcate in farmers practices of precision irrigation like drip irrigation through awareness for optimal results while at the same time sensitizing them about importance of water conservation. Equal importance is being given to make water available to every farm and then putting it to effective use.

One of the vital components of PMKSY is Per Drop More Crop (PDMC) which aims to develop a mechanism for water use efficiency through micro irrigation. The findings of an impact evaluation study of 2014 evince that by employing the best techniques of micro-irrigation (by facilitating use of sprinkler and drip irrigation), radical changes have come about which includes (a) increase in irrigated land from same source by 8.41%, (b) increase in area under horticulture crops, (c) average reduction in irrigation cost by 32.3%, (d) average reduction in electricity consumption by 31%, (e) average reduction in use of fertilizers by 28% and (f) increase in average productivity of fruits and vegetables by 42.3% and 52.8% respectively. The overall benefits of these positive changes reflected in income enhancement of the farmers.

It is noteworthy that under PDMC, in the past two years, the land covered under micro-irrigation exceeds the target. While an area of 5.72 lakh hectares was covered in 2015-16 against the target of 5 lakh hectares, an area of 8.13 lakh hectares was covered in 2016-17 against the target of 8

lakh hectares. The government has been able to perform better than the set targets as effective monitoring mechanisms like Bhuvan integration app for geo-tagging of interventions has been put in place.

A total of 8,214 projects to cover an area of 39.07 million ha have been sanctioned for watershed development projects under Integrated Watershed Management Programme (IWMP). Out of which completion report of 945 projects has been received. Another 541 projects are in the consolidation phase, 4,402 have moved to the works phase and 2326 are in the preparatory phase.

## **OTHER INITIATIVES TAKEN UNDER SHORT-TERM PLAN**

### **Bridging the gap between IPC and IPU**

The scheme targets to bridge a gap of 80 Lakh ha (Lha) under 317 projects having total CCA of 178 Lha in 24 States at a cost of Rs.61,237 crore. The Central share in this scheme Rs.38,480 crore which will be completed in next four years. The scheme has three primary objectives/ components, with 'Project Management' forming the fourth component, as brought out below:

1. Bridging gap between IPC and IPU by completion of outstanding 'On Farm Development (OFD)' works in 56 Lha area, and by correction of system deficiency in the canal network to the extent required in 178 Lha area;
2. Improving water-use efficiency and providing assured supply of water to every farm field. This objective will be met by activities of: micro-irrigation (in 24 Lha), solar power backup (7.2 Lha), reuse of waste-water (10 projects in different States), conjunctive use of groundwater (16.8 Lha), and canal automation (through 10 pilot projects) for introducing elements of control and measurement for demand-side management.
3. Transfer of control and management of irrigation system to Water Users Associations (WUAs) with focus on Participatory Irrigation Management (PIM). This objective will involve creation and strengthening of about 16,000 WUAs through hand-holdings as well as financial assistance in the form of functional and infrastructure grants. It will also cover modernization, extension, and creation of 'Water & Land Management Institutes (WALMIs)' in the States. The existing 14 WALMIs will be strengthened and 7 new WALMIs will be set up
4. The Project Management component will cover financing of incremental establishment cost as well as capacity building of Project Implementing Agencies (PIAs) and WUAs during four years of project implementation period.

### **Sustainable Development of Ground Water Resources in Eastern and North-Eastern regions**

There are 112 irrigation deprived districts, especially in the Eastern and North-Eastern States of the Country, where groundwater development is quite low. The groundwater-based irrigation could be developed sustainably in these districts. This Ministry is preparing a scheme for 96 districts (in 12 states viz. Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, MP, Maharashtra, Odisha, UP and West Bengal) out of above 112 districts keeping in view of rainfall, recharge possibilities, ground water situation to provide assured irrigation in an area of 21.35 Lha. The estimated cost for the project is Rs.39,476 crore with the central share of Rs.25,391 crore. The scheme is to be implemented in next 3 years.

Under this scheme, irrigation facilities will be created through tube wells, dug wells, bore wells and dug cum bore wells. Districts having scope for further groundwater development without endangering groundwater sustainability are identified on the basis of less than 30 per cent of the

land holdings under irrigation, average annual rainfall of 750 mm , more and shallow groundwater levels and less than 60 per cent of the annual replenishable groundwater resources been developed.

The scheme proposes to construct 9.49 lakh groundwater abstraction structures (dug wells/dug-cum bore wells/ tubewells/ bore wells) and envisages convergence with PMKSY-Watershed Component and MGNREGA for supporting water harvesting and groundwater recharge interventions for sustaining long term groundwater development. The scheme proposes to fund construction cost of well with material , Pump (Solar/ Electric/ Diesel) , 200 m of canvas pipe for water distribution and the cost of investigation for site selection.

## **ADDITIONAL POTENTIAL CREATION THROUGH INTERLINKING OF RIVERS**

### ***Ken Betwa link project***

Ken-Betwa link project is likely to be started during current year. It envisages creation of 1 Lha potential by 2019 and total 6.35 Lha by 2025 in the drought affected Bundelkhand region of Madhya Pradesh and Uttar Pradesh.

The Ken-Betwa link Project (KBLP) Phase-I envisages diversion of surplus water of Ken basin to water deficit Betwa basin. The project will provide irrigation to an area of 6,35,661 ha annually (3,69,881 ha in MP and 2,65,780 ha in UP) in the Chhattarpur, Tikamgarh & Panna districts of Madhya Pradesh and Mahoba, Banda, Jhansi & Lalitpur districts of Uttar Pradesh. The project will provide 49 million cubic meter (MCM) of water for drinking water supply to about 14 lakh population of MP & UP in the enroute of the link. The project will also generate 78 MW of power.

The cost of the project is Rs.18,000 crore out of which 90% would be provided by Central Government.

### **Par-Tapi Narmada Link Project**

The Par-Tapi-Narmada Link project envisages to provide irrigation in 2.32 Lakh ha. of drought prone areas in Saurashtra region of Gujarat. The maximum irrigation facilities would be provided to Tribal areas enroute the link canal lying on Right side including drought prone Saurashtra region of Gujarat. The link project will also cater the command areas of five projects namely Khuntali, Ugta, Sidhumber, Khata Amba, Zankhari, proposed by Govt. of Gujarat. Command in Tribal areas of Chhota Udepur and Panchmahal districts from Narmada Main canal on substitution basis, Tribal dominant districts of Dangs & Valsad of Gujarat State and Nasik district of Maharashtra State along with drinking water of most of the villages in the vicinity and filling of most of Panchayat tanks will be served under Par-Tapi-Narmada link canal.

The Par-Tapi-Narmada link project comprises 6 dams viz. i) Jheri dam across river Par in Peint taluka of Nasik district in Maharashtra; ii) Paikhed dam across river Nar – a tributary of river Par, iii) Chasmandva dam across river Tan–tributary of river Auranga—all in Dharampur taluka of Valsad district in Gujarat; iv) Chikkar dam across river Ambica, v) Dabdar dam across river Khapri – a tributary of river Ambica and vi) Kelwan dam across river Purna – all in Ahwa taluka of Dangs district in Gujarat. Also, construction of 2 diversion barrages—one each in the downstream of Paikhed and Chasmandva dams; 6 power houses; and construction of about 406.118 km long link canal (including feeder canals and tunnels along the link canal) passing through Dharampur taluka of Valsad district, Ahwa taluka of Dangs district, Vansda taluka of Navsari district, Vyara and Songadh talukas of Tapi district, Mandvi and Mangrol talukas of Surat district, Valia, Jhagadia and Nandod talukas of Bharuch district, Tilakwada and Sankheda talukas of Vadodara district of

Gujarat connecting all 6 dams with existing Miyagam Branch Canal of Narmada Canal System of Sardar Sarovar Project are envisaged.

The total cost of the link project works out to be Rs. 9893 crore ( 2014-15 price level). Further, action is being taken to expedite requisite clearances.

### **Damanganga-Pinjal Link Project**

Damanganga-Pinjal Link Project envisages transfer of surplus water of Damanganga basin available at proposed Bhugad and Khargihill dam sites to the Pinjal dam (proposed by Government of Maharashtra across river Pinjal, a tributary of Vaitarna River) from where the combined surplus waters of Damanganga and Pinjal rivers (895 MCM) will be taken to Mumbai city to augment its domestic water supply. The Project envisages construction of a dam across river Damanganga near Bhugad village in Trimbak taluka of Nasik district of Maharashtra; a dam at Khargihill across river Vagh ( a tributary of Damanganga) near village Behadpada in Jawhar taluka of Thane district of Maharashtra; a dam across river Pinjal near village Khidse in Wada taluka of Thane district (proposed by Government of Maharashtra); and 2 tunnels connecting Bhugad reservoir with Khargihill reservoir having length of 17.488 km and Khargihill reservoir with Pinjal reservoir having length of 25.244 km. Two power houses one in downstream of Bhugad reservoir ( 2 units of 1MW each) and other in downstream of Khargihill reservoirs (2 units of 1.5 MW each) are proposed. The combined surplus waters of Bhugad and Khargihill reservoirs of Damanganga basin and Pinjal reservoir of Vaitarna basin for transfer to Mumbai city is assessed to be 895 Mm<sup>3</sup>.

The total cost of the project has been estimated to 3008.49 crores (PL-2015). The Detailed Project Report of this link project has been completed. Further action is being taken to expedite the requisite clearances for this project.

## **CONCLUSIONS**

The foregoing initiatives shall help in meeting challenges in supply as well as demand side management. Implementation of 99 projects shall help in increasing potential creation by about 35 Lakh Ha. and complete utilisation of their ultimate potential of 76 Lakh Ha. Further, PMKSY addresses the concerns of growing water scarcity in the country by promoting water conservation through Per Drop More Crop and Watershed Management.

This scheme will achieve convergence of investments in irrigation at the field level across concerned Ministries to enhance the physical access of water on the farm and expand cultivable area under assured irrigation , improve on-farm water use efficiency to reduce wastage and increase availability both in duration and extent, adoption of precision-irrigation and other water saving technologies ,enhance recharge of aquifers and introduce sustainable water conservation practices, ensure the integrated development of rain fed areas using the watershed approach towards soil and water conservation, regeneration of ground water, arresting runoff, providing livelihood options and other NRM activities, promote extension activities relating to water harvesting, water management and crop alignment for farmers and grass root level field functionaries, explore the feasibility of reusing treated municipal waste water for Peri-urban agriculture, and attract greater private investments in precision irrigation.

Other short term measures such as scheme for bridging gap between IPC and IPU, development of ground water resources in Eastern and North Eastern region of the country, ILR projects etc. have been planned in such a way that they will take care of both the supply side as well as demand side management in the short term. Further, the planning for medium and long term goals has also been initiated so that not only the ultimate irrigation potential of 140 Mha (as assessed

presently) is fully created but also utilised in a sustainable way with the help of participatory irrigation management through Water User Associations and beneficiaries. This shall help in big way for meeting the food demand of the country which is expected to rise to about 405 MT in 2050.

In a nutshell, impediments are being dealt with, accountabilities are being fixed, transparency is being ensured and awareness is being created to meet time-bound targets. The goal has been set and all efforts to reach the destination are in full swing.

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