BRIEF NOTE ON "EFFICIENT WATER MANAGEMENT CHALLENGES AND OPPORTINUTIES.

India with 2.4% of the world's total area has 16% of the world's population; but has only 4% of the total available fresh water. This clearly indicates the need for water resource development, conservation, and optimum use. Fortunately, at a macro level India is not short of water. The problems that seem to loom large over the sector are manageable and the challenges facing it are not insurmountable (impossible) .

GEOGRAPHICAL AREA:

The Karnataka State is the eighth largest State in the country and is located in the Deccan plateau. The geographical area of Karnataka is 1,90,498 sq.km accounting for 5.81% of the total area of the Country.

CLIMATE:-

The climate of Karnataka State varies from very humid rainy monsoonal climate in the West Coast, the ghats and malnad areas to semiarid warm dry climate on the east. There is a large variation in the rainfall with higher amounts in the Western Ghats and reducing towards the eastern plains. Along the coastal Dakshina Kannada District, the normal rainfall is about 4000 mm and in the drought prone districts of Bijapur, Raichur, Bellary etc., the rainfall is of the order of 500mm to 600mm.

The average annual yield of the rivers of the Karnataka has been roughly estimated as 98406 m.cum. (3475 Tmc). The basin wise breakup of this yield is given in the following table:

Sl. No.	River System	Estimated average yield in		
		M.cum	TMC	Percentage
1	Krishna	27,451	969.44	27.90
2	Cauvery	12,034	425.00	12.23
3	Godavari	1,415	49.97	1.44
4	West Flowing river	56,600	1998.83	57.51
5	North Pennar	906	32.00	0.92
6	South Pennar			
7	Palar			
	TOTAL	**98406**	**3475.24**	**100**

The gross irrigated area does not seem to be rising in a manner that it should be, given the investment in irrigation. The difference between potential created and area actually irrigated remains large. Unless we bridge the gap, significant increase in agricultural production will be difficult to realize. At the same time water conflicts are increasing. Apart from the traditional conflicts about water rights between upper and lower riparian's in a river.

Problems facing the irrigation sector / *Challenges:-*

1. Water logging and salinity

In agricultural point of view, Water logging of land is a situation of adverse air water proportion in the sub soil root zone. Primary reasons for water logging are over irrigation, lack of conjunctive irrigation, seepage from canals and irrigation channels.
Farmers with their lands in head reaches of a command area are more susceptible to the problem of water logging and as a result, salinity. Farmers have become poorer owing to these growing problems.

3. Declining Water use efficiency:-

Water use efficiency is presently estimated to be only 31.76% for canal irrigation in UKP and the fallowing net increase in efficiency will be achieved by implementing ERM

			For NLBC System	
		Achievable Limits as per CWC Guidelines	**Existing Efficiencies**	**Efficiencies After Implementation of ERM**
Reservoir Efficiency		95% - 98%	92%	92%
Conveyance Efficiency	Fully Lined System Partially Lined System Unlined System	70% - 75% 65% 60%	60.02%	75%
On Farm Field Application	Sprinkler/ Drip Irrigation Basin/ Furrow Irrigation	85% 65%	52.9%	70%
Drainage Efficiency		80%	70.9%	80%
IPU/IPC		85%	65%	100%
Overall WUE	60% - 65% (46% - 50%)	31.76%		**52.5%**

5. Ground water Depletion

Agriculture in India, as in many other developing countries, has continued to be the single largest user of water, accounting for as much as 85% of the total annual withdrawals. It is often felt that the availability of cheap water to the agricultural sector has tended to encourage its pre-emption for a low value, high volume use, and has encouraged its waste and profligate (wasteful) consumption. Within irrigation, a significant trend has been the rising share of ground water in net area irrigated as well as the value of agricultural produce. Ground water over exploitation is a major concern in certain parts of the country. In Punjab, for instance, the level of exploitation is already at the level of around 98%, followed by Haryana with 80%. The situation is also precarious in states such as Rajasthan and Tamil Nadu where the level of exploitation is about 62% and 54% respectively. Several parts of these states have seen a steep decline in water tables, often implying that water is being 'mined', or extracted at unsustainable rates.

6. Under Utilisation of water resources

The total received water resources at the national level sum up to about 4000 Km3 and the total available water resources amounts to 1953 Km3. It has been estimated that only 1122Km3, of the resource is utilisable. In other words, only 27 % of the total received resource can be gainfully utilised. Of this amount, 690 Km3 is the utilisable surface water while 396 Km3 is the utilisable groundwater.

- Vandalism of structures to divert more water to their fields by farmers.
- Lack of measuring devices and Tampered/Ungated offtakes resulting in over drawl of (Improper flow control)
- water by the farmers in upper reaches of command area.
- Practice of night irrigation not followed judiciously by the farmers resulting in wastage of water
- Leakage in structures due to tampering
- Violation of rotation system
- CRs are not used for water level control
- Lack of training to the farmers for effective & optimum use of water
- Ineffective / defunct WUCS
- Lack of communication , information system & insufficient operators
- Absence of proper surface and subsurface drainage systems
- Excess irrigation resulting in water logging, salinity /alkalinity
- Violation of cropping pattern by the farmers.

Opportunities

- **For Agricultural Activities :**
- Dissemination of Information and knowledge base to farmer community.
- Water auditing, volumetric pricing and demand-based supply to be a reality after system automation .
- Reclamation of water logged / salinity affected land
- Land leveling in potential areas
- Soil Fertility Management & Providing GPS-based Soil Health Cards
- Mechanization Facilitation Center
- Implementation of Warabandi.
- Rejuvenation of the defunct WUCSs
- Formation of new WUCSs
- Establishment of Facilitation Centers & Information Kiosks
- Training and Capacity Building Activities
- Incentives to WUCSs - with checks to ensure performance based disbursements to WUCSs
- With assurance of Demand-based supply and interactive exchange of information through Automation, WUCSs will be on a sound platform to carry out their assigned role
- Modern irrigation technologies, particularly sprinkler and drip irrigation, increase water use efficiency.
- Gravity pressure drip irrigation system using topographical advantage
- Drip system with pumping system using solar power
- Drip system with pumping system using electric power
- Providing the beneficiary with a new technology tool in the form of Drip irrigation which will help in efficient , easier, professionally managed system to achieve maximum potential.
- Aiding in covering large area with the available water by way of savings achieved through adoption of Drip irrigation system
- Enhancing water productivity resulting in increase in agricultural production and water use efficiency.
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- Training and Capacity Building Activities
- Incentives to WUCSs - with checks to ensure performance based disbursements to WUCSs
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Participatory Irrigation Management (PIM)

"Participatory Irrigation Management (PIM) refers to the involvement such as planning, designing, construction and supervision, policy and decision making, operation and maintenance (O and M) and evaluation of irrigation system".

The objectives vary from place to place within the country, but generally directed at improving the operation and maintenance of the irrigation system, increasing efficiency in the use of water, reducing the Government expenditure on irrigation, increase the collection of revenue.

PIM in Karnataka

The associations were named as **"Water User's Co-operative Societies" (WUCSs)** and the task of organizing them was entrusted to the Command Area Development Authority (CADA).

• To initiate participation of the farmers in water management, irrigation scheduling, distribution and maintenance of system at micro level.
• To improve irrigation as well as water use efficiency.
• To make best use of natural precipitation and ground water in conjunctive with the canal water.
• To develop a sense of economy in water use amongst the users.

- To facilitate the users to have a choice in selecting crops, cropping sequence, timing of water supply depending upon the soil and availability of water, climate and other infrastructure facilities available in the command such as road, markets, cold storage etc., so as to maximize the income and profit.
- To delineate responsibilities of water distribution and maintenance of system between the users both relating to allocation and actual supply of water.
- To facilitate resolution of conflicts among farmers.
  To entrust collective and community responsibilities to the farmers to collect water charges and remittance to government.
- To improve and sophisticate deliveries precisely as per crop need by the department at the supply point of the minors and thus reduce operation losses.
- To create healthy atmosphere between the managers and users in the entire operation.

Conclusion :

Irrigation and drainage are vital and necessary legs of the Green Revolution tripod of seeds,fertiliser, and water control. They have played a critical role in the prevention of famines and widespread starvation. Technological improvements in irrigation systems have also increased production opportunities. Modern irrigation technologies, particularly sprinkler and drip irrigation, increase water use efficiency. They have opened up opportunities to cultivate soils with low water-holding capacity (sandy and rock soils) and to farm low quality lands and steep slopes. If India's aspirations for continued economic growth and improved social and environmental conditions are to be met, fundamental changes in how water is captured, allocated, planned and managed should be given adequate importance. The future lies with increasing the efficiency and environmental sustainability of water use in irrigation, and improving the financial sustainability of existing irrigation, drainage and water supply investments. The world of distance and conventional education are converging. The market is no longer local, but global. The fear for many is that delays in moving to electronic networking will result in challenges to the institution's survival. Agricultural Universities and research institutes have to plan for, or to implement, some form of electronic networking to educate farming community on water management technologies.