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National Level Seminar on Climate Change, Water Resource Management and Livelihood Adaptation

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National Level Seminar on "Climate Change, Water Resource Management and Livelihood Adaptation"

On 7th May 2016 at Circuit House Ahmedabad

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OVER VIEW

Indian Economy is doing extremely well. The rate of growth of GDP is between 7 to 8%. Poverty in rural areas has declined from 80% to 20% prior to Independence. Country used to import food grains in the initial years, but since then it has gained self sufficiency and now exports.

Agriculture growth has been steady at the average of 2% to 4% except last two years. Although rural livelihood has improved, there are huge numbers who are behind poverty line. The farmers like to leave farming as it is not profitable – some wed Naxalism – others migrate. Although Country has achieved Food Security, now guaranteed it to the poor people by an enactment, the livelihood is an issue.

Irrespective of impact of Climate Change, the Food Security and Livelihood are inter-related and there are problems.

Food Security: Due to rapid increase of non-agriculture activities like urbanisation, industrialisation and infrastructure development, area under agriculture and food production is getting reduced. With increasing urban middle class population, demand for food, Dairy and Meat products is increasing. There will be huge gap between demand and supply position in years to come.

Water Scarcity: Again due to enhanced urbanisation and Industrial activity, even water meant for irrigation in Dams and Reservoirs– Lake are getting diverted to meet increased urbanities demand. Further big new Township are using huge pumps which draw out daily large quantity underground water which resource is becoming increasingly depleted.

In arena of Climate Change, temperature is rising, monsoon is becoming irregular with long dry spell and incidence of heavy rainfall in one day. This has direct adverse impact. The Agriculture productivity is directly related with Soil Moisture and availability of timely water and same is true for livestock, the milk yield, the poultry yield goes down. Country is already seeing this impact on decline of Food productivity and production and run for drinking water, both in urban and rural areas. Hence for Food Security, the water security is must and a prerequisite. It is this context, we need to examine water availability and its use. The Mint News paper has brought out recently two interesting articles on 26-27of April 2016 which provides some basic facts.

Drought in India – Current year affecting 33 crore in 256 districts. India's average water footprint both direct and indirect use of surface/ground water, for major crops – wheat, paddy, maize, sugarcane and cotton is higher than global average. And there is inefficient use of water.
The report observes that the important States have inefficient use of water of following major crops:

Andhra Pradesh	- Rice, maize, cotton
Gujarat	- Cotton
Maharashtra	- Maize, sugarcane, cotton
Karnataka	- Maize, sugarcane, cotton
Punjab	- Wheat
West Bengal	- Rice
Madhya Pradesh	- Wheat
Uttar Pradesh	- Rice

Country as a whole is using water insufficiently. Further India has less than average per capita water footprint.

The Mint News Paper – 27th April 2016, writes how India is virtual exporter of water. The study has calculated quantum of water used for production in Agriculture and by livestock. According to Water Footprint Network (WFN). It takes 2173 litres of water to produce a KG of rice. In 2014-15 India exported 37.2 lack tonnes of Basmati. To export this rice, Country used 10 trillion litres of water or alternatively it exported water equivalent to that quantity.

Similar is the situation for Dairy and Meat products. E.g. in case of goat meat, per kg requirement goes up to 8763 litres.

Since we do want to Export our Agriculture produce, the major policy implication is to introduce efficient use of water resources.

As regards water availability various studies including that of Dr. Tushar Shah and other revealed that underground water sources – sweet water are depleting and enhancing penetration of saline water of sea through faults both underground and over ground. The impact is in Gujarat and elsewhere. The recent study by Prof. Jay Famiglietti using NASA Satellite called GRACE reveals that in India – Rajasthan, Punjab, Haryana region is losing about 17.7 kilo meters of ground water per year (Times of India – 1st May 2016) Hence water conservation is another key issue. Not that policy and programme do not exist what is not existing is compulsion and/or awareness the value of water and need to conserve it and use it efficiently.

Some examples of current inefficiency in use of water resources are:

- Majority of farm irrigation is flood irrigation. Water gets wasted in areas where it is not needed. Whether it is underground or canal irrigation, water goes through entire farm. Drip irrigation exists – but to very limited areas

- The public irrigation system – Canals are all open subject to evaporation and further also have flood irrigation to sub-canals and farms.

- We do not have yet standardised what crops, plants or fruit trees or for that matter livestock (depending on its weight) how much water is needed to nourish it. In many a cases, excess water is given then needed. There is a need to calculate this crop wise and - in case of Animals depending on their weight and give farmers Agro advisory.

- Another important factor is the entire canal irrigation water is almost free and energy charges for pumping water are heavily subsidized. Hence there is tendency to waste. The value of water as a scarce resource is unknown. Even in urban areas, there is no control in use of water – like having meter.

- Further we have recurrent Floods now even in dry areas. Historically, Uttarakhand, Uttar Pradesh, Assam and many other parts were affected by floods. This is resulting into a huge lose to both of human beings, property and erosion of infrastructure and soil Apart from affecting livelihood of people. It also results into lose of sweet water every year. While the areas of Saurashtra, Kutch, North Gujarat and Vidarbha Maharashtra are most often affected by water scarcity. But due to Climate change even in these areas there are days of heavy rain in last few years causing instant flood. Management of flood is an important policy matter as due to lack of care, the water is wasted due to many other reasons becomes cause of flood!

- Silting in check dam/Dams
- Silting in river valley
- Silting in river bed
- Growth of bushes in canals
- In correct data about absorbing capacity of river
- Data about sea-water-level not coordinated
- Soil erosion in river basin area
- Data about sedimentation – old
- Flood level not marked
- Encroachment on river- side.
- No policy for River basin Management.

All these cause more floods and wastage of water resources. We need an Integrated Management Policy Framework.

The overall impact and vulnerability of areas are in following tables.

Climate change and its impact on water cycle,

Element of Water Cycle	Climate Change
Annual precipitation	Expected to increase globally during the 21st Century, with potentially great spatial variations
Inter-annual variations in precipitations	Expected to increase everywhere
Seasonal variability of rainfall	• Expected to increase everywhere • Delayed monsoon • Interim delay with in season
Soil moisture stress (droughts)	Moisture stress to generally increase as a result of increasing variability of rainfall distribution (longer periods without rain) and increasing temperatures and deplete soil moisture faster than natural vegetation
Floods	Increased as a result of increasing frequency and intensity of extreme rainfall events flood intensity can affect standing crops, washing away of upper fertile crust of soil & cause soil erosion (Navsari District)
River discharge (Kutch District)	Increased variability as a result of changes in rainfall patterns. Changes in annual runoff expected to vary from region to region
Groundwater	Varies as a function of changes in rainfall volumes and distribution. Impact is complex, with floods contributing to increasing recharge, and droughts leading to increased pumping
Evapotranspiration	Increases as a function of temperature increases
Water quality (in rivers, lakes and aquifers)	Moderate impact through temperature increase
Salinity in rivers and aquifers	Potentially high impact where sea water level rise combines with reduced runoff and increased withdrawal
Source: adapted from a comparative analysis of Turral et al., 2011; Comprehensive Assessment, 2007	

The Vulnerability of Areas to Climate Change

Vulnerability			Typical response Main climate options
Main Climate Change Exposure	**Sensitivity**	**Adaptive capacity**	
Rainfall variability, droughts, floods	High: mostly rain fed agriculture, marginal lands, poor soil moisture capacity	Low: high prevalence of poverty, limited options, knowledge, social safety nets and resources	Watershed management and on farm water storage for water conservation; Integrated water resources management in river basins; investment in social infrastructures
High temperatures, rainfall variability, droughts	High: crop and animal sensitivity to high temperature and droughts, high population density on marginal lands	Low: high prevalence of poverty, limited options, knowledge, social safety nets and resources, limited capacity for water storage	On-farm water storage; use of drip and sprinklers, crop insurance; increased productivity through better crop-livestock integration; integrated water resources management
Reduction in annual rainfall, increased rainfall variability, reduction in runoff and aquifer recharge, high temperatures, higher occurrence of droughts and floods	Variable, depending on the region and level on reliance on agricultural activities. Agricultural systems highly sensitive to changes in temperature and water availability.	Low adaptive capacity for agriculture in water scarce areas	Water conservation where possible; integrated water resources management; crop insurance; improved floods and drought management plans; shifting out of agriculture
Increased rainfall variability, reduced water availability in places.	Medium to low. Some high yielding varieties more sensitive to temperature and water stress . Rain-fed agriculture	Possibilities to compensate water stress through supplemental irrigation in many regions; low capacity in water scarce areas	On-farm storage for supplemental irrigation; integrated water resources management at river basin level
Source: adapted from CSA Source, FAO 2013			

In India, distribution of rainfall is highly non-uniform both in terms of time and space. As a result water is required to be stored and utilized for meeting the demands of different sectors throughout the year. Efficient water management requires sustainable development of the available surface and ground water resources and their optimal utilizations including enhanced use of micro-irrigation system. But there are some important issues which need to be addressed:

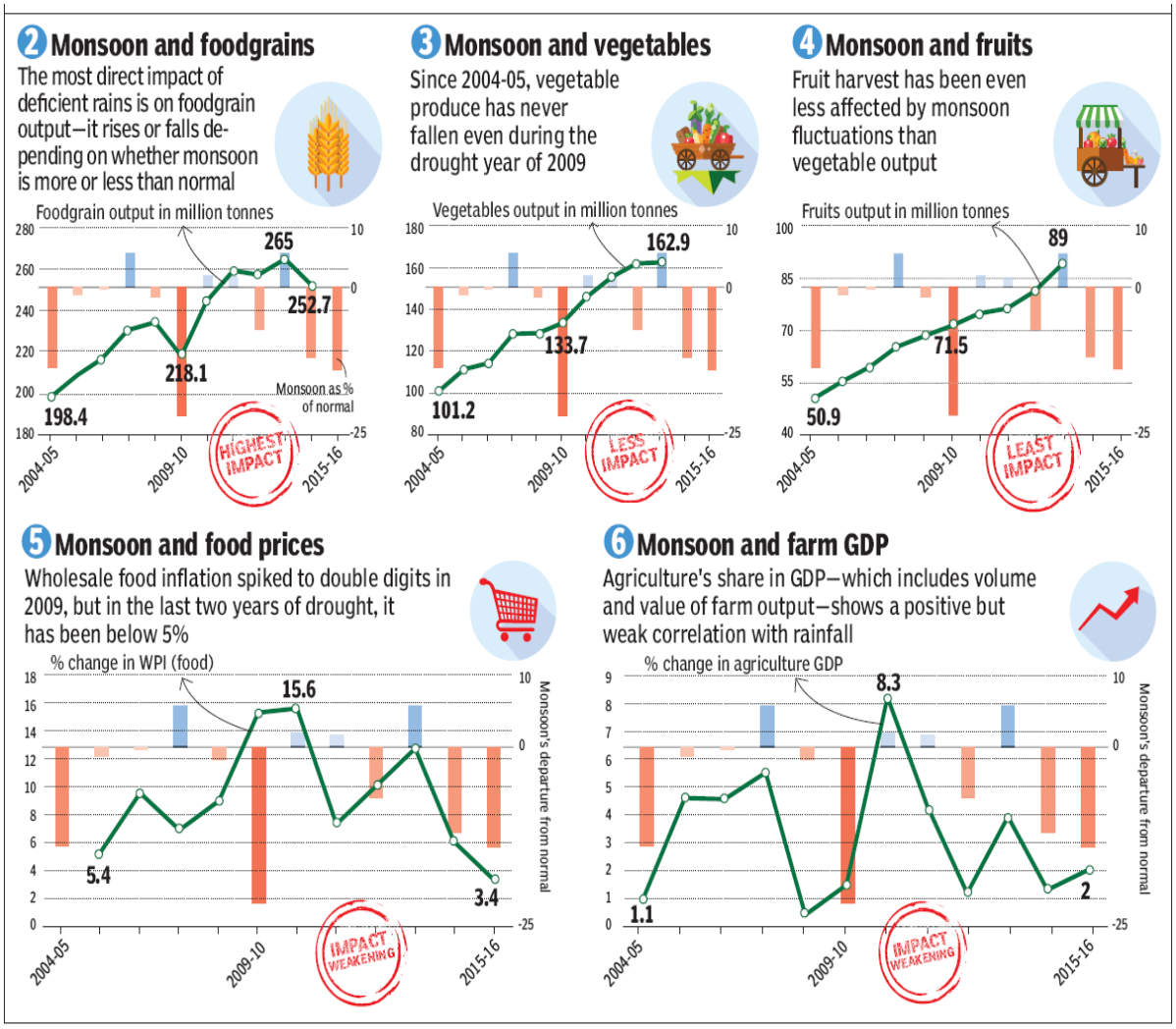
- Water is going to become very scares. It is the key requirement for Food Productivity hence how to make it as a commodity with value – price as of how both urbanities and farmers get it almost free.
- How to control new Urban Township – they consume huge underground and canal water resources?
- How to introduce compulsory recycling of water both in Urban – Rural areas and make it available irrigation
- How to make drip irrigation – a way of life in farming.
- Can we decide to have 'piped' canals instead of current open system or replace it? Can we learn from Israel or from our town traditional water conservation system like that of "step well or tunnels"?
- How to ensure safe drinking water even in years of drought.

- How to use bio-diversity, identify salinity resistance crops and propagate them.
- Can we introduce micro-level Water Resource Management plan for every Village and Block?

CONCLUSION

Climate change impacts the extent and productivity of both irrigated and rainfed agriculture. Rising temperatures will translate into increased crop water demand, so will be demand of increasing Urbanities. Both the livelihoods of rural communities and the food security of a predominantly urban population are therefore at risk from water-related impacts linked primarily to climate variability. Increasing soil salinity is already affecting the root zone and hence productivity. Management of saline water ingress is the third dimension of impeding challenges. The rural poor, who are the most vulnerable, are likely to be disproportionately affected, so will be their livelihood. Various adaptation measures that deal with climate variability and build upon improved land and water management practices conservation and its efficient use have the potential to create resilience to climate change and to enhance water security. In order to meet the challenge of Food Security, first, there is a need to understand the need of water

security. In addition to existing programmes, there is a need to educate and make responsible entire population including our Public Leaders about value that water will have in years to come – its likely scarcity and impact on livelihood and Food Security both of urban and rural population. And also importantly on social tranquil and tensions resulting into water riots!



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