DAMS – SAVIOR OF ECOLOGY AND MANKIND

Vivek P. Kapadia
Government of Gujarat, India

India in Grip of Droughts and Floods

Tropical Countries are Worst Hit by Climate Change

Details of Droughts Since Independence

Year	Percentage of affected area in India	Category
1951	33.2	Moderate
1952	25.8	Slight
1965	42.9	Moderate
1966	32.3	Moderate
1968	20.6	Slight
1969	19.9	Slight
1971	13.3	Slight
1972	44.4	Severe
1974	29.3	Moderate
1979	39.4	Moderate
1982	33.1	Moderate
1985	30.1	Moderate
1986	19.0	Slight
1987	49.2	Severe
2002	Areas in 14 States	Severe

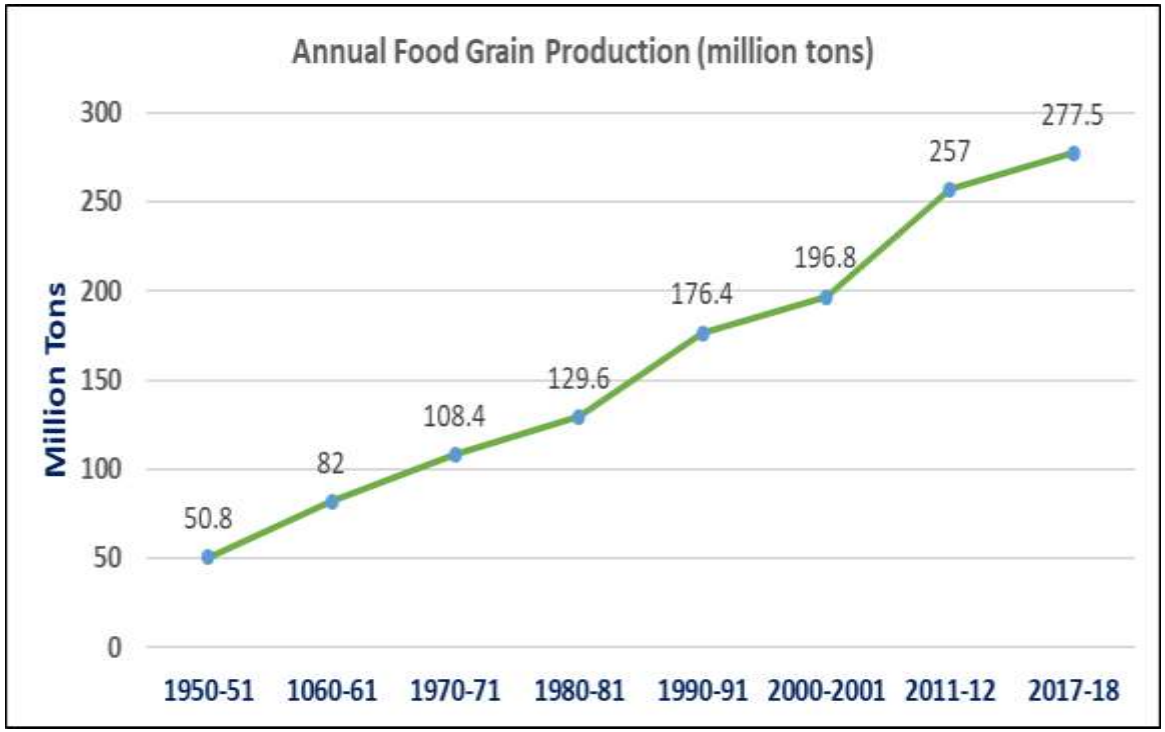
Regions with annual rainfall less than 400 mm occupy 12% and the area below 750 mm rainfall is 35%.

- Floods in India - losses of 3$ billion per year i.e. 10% of the global economic losses
- Three-fold increase in widespread extreme events during 1950-2015
- 268 reported flooding events over 1950-2015 affecting about 825 million people, leaving 17 million homeless and killing about 69,000 people

India Attained Food Security Thanks To Its Dams

Service to Mankind

Over 4000 DAMS – Storage Potential increased from 15 BCM to 200 BCM



300 million people - 144.1 Kg/ year per capita (including import) in 1950-51

1250 million people - 177.9 Kg/ year per capita (no import) in 2016

Gujarat – An Acutely Water Stressed State of India

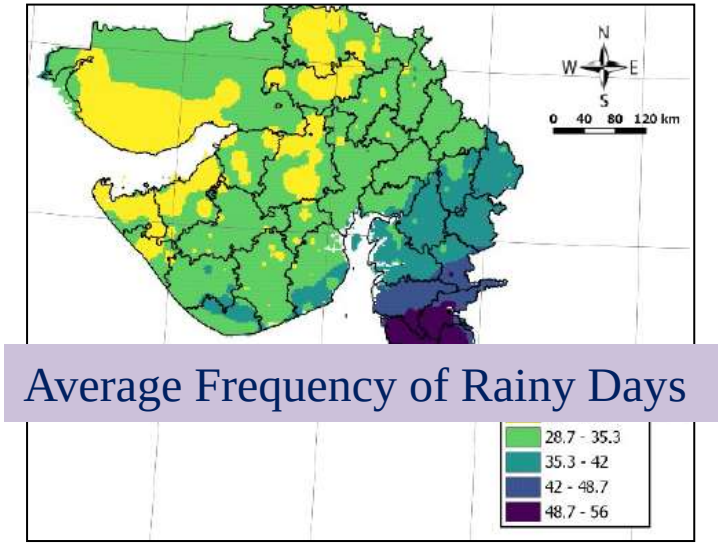
Strategy – Water Conservation

Motivational Factor – Water and Energy Nexus

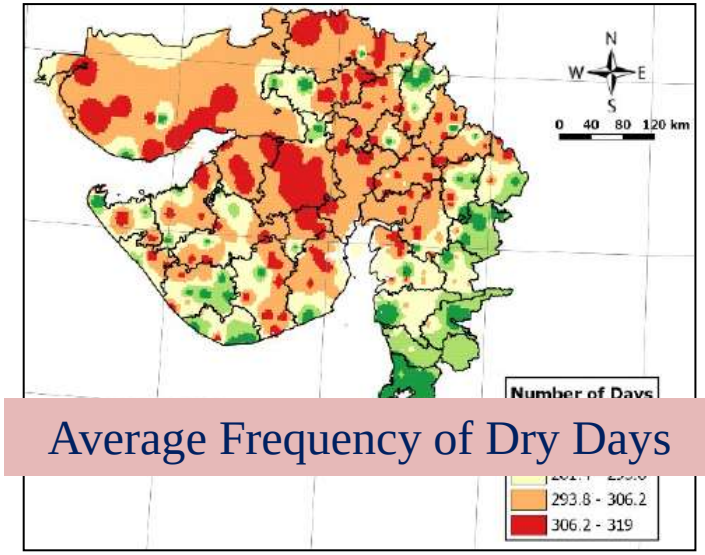
Dams Serve Ecology by Saving Carbon and Water Footprints

Rainfall Distribution of Gujarat

Name of Region	Annual Rainfall in mm	No. of River Basins
Gujarat Plain	800 to 2000	17
Saurashtra	400 to 800	71
Kachchh	Less than 400	97



Average Frequency of Rainy Days



Average Frequency of Dry Days

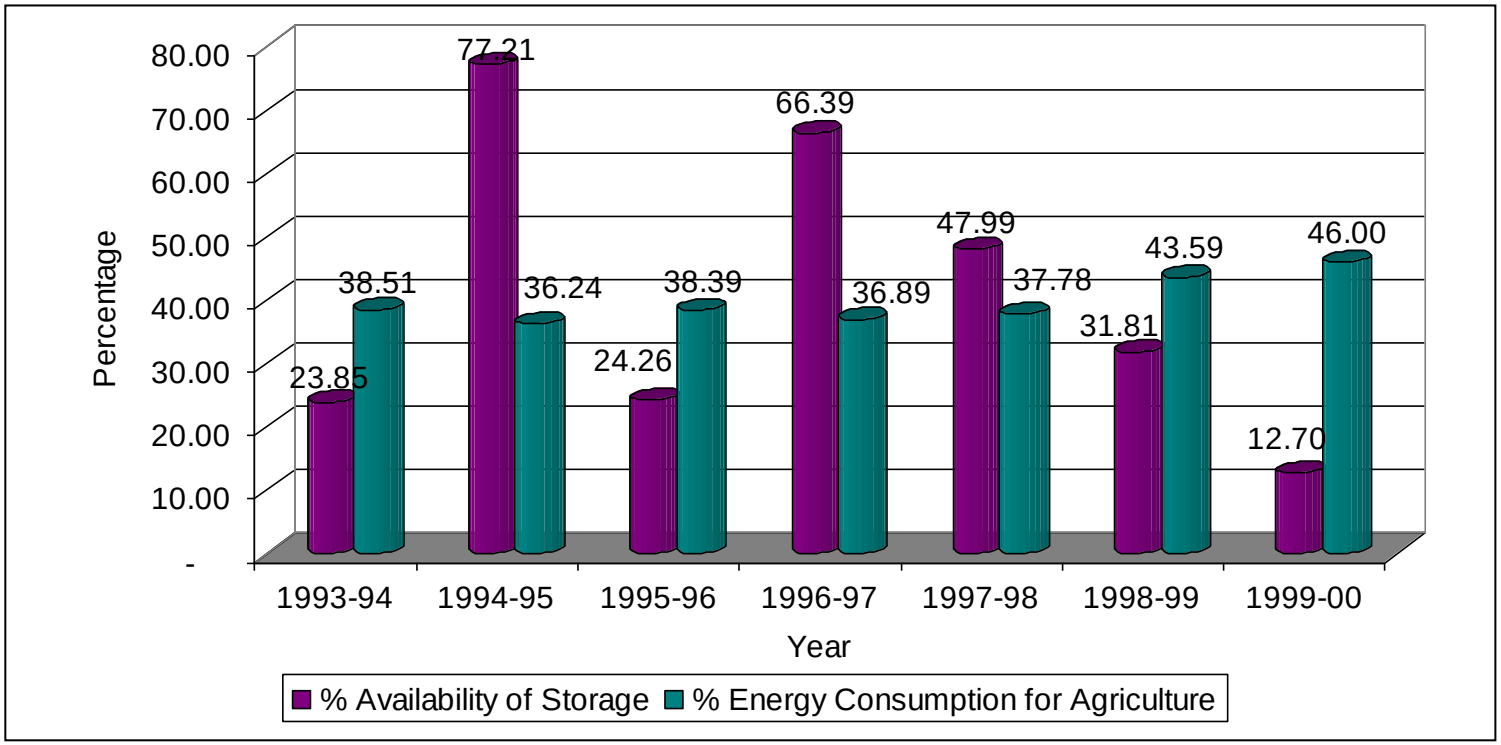
A large arid area - 62,180 km^2 (31.72%)

A larger semi-arid area - 90,520 km^2 (46.18%)

Drought Periodicity – 1 in 3 years

Acute Water Stress

Water Conservation of All Scales



- **Surface Water Available - 38,000 MCM**
- Storage potential of 206 dams - 25,224 MCM
- Storage potential of unclassified small water conservation structures (549902) -1100 MCM
- Storage potential of Minor Irrigation Schemes and Water Bodies (33304) - 500 MCM
- **Ultimate Storage Potential – 26,500 MCM Approximately**

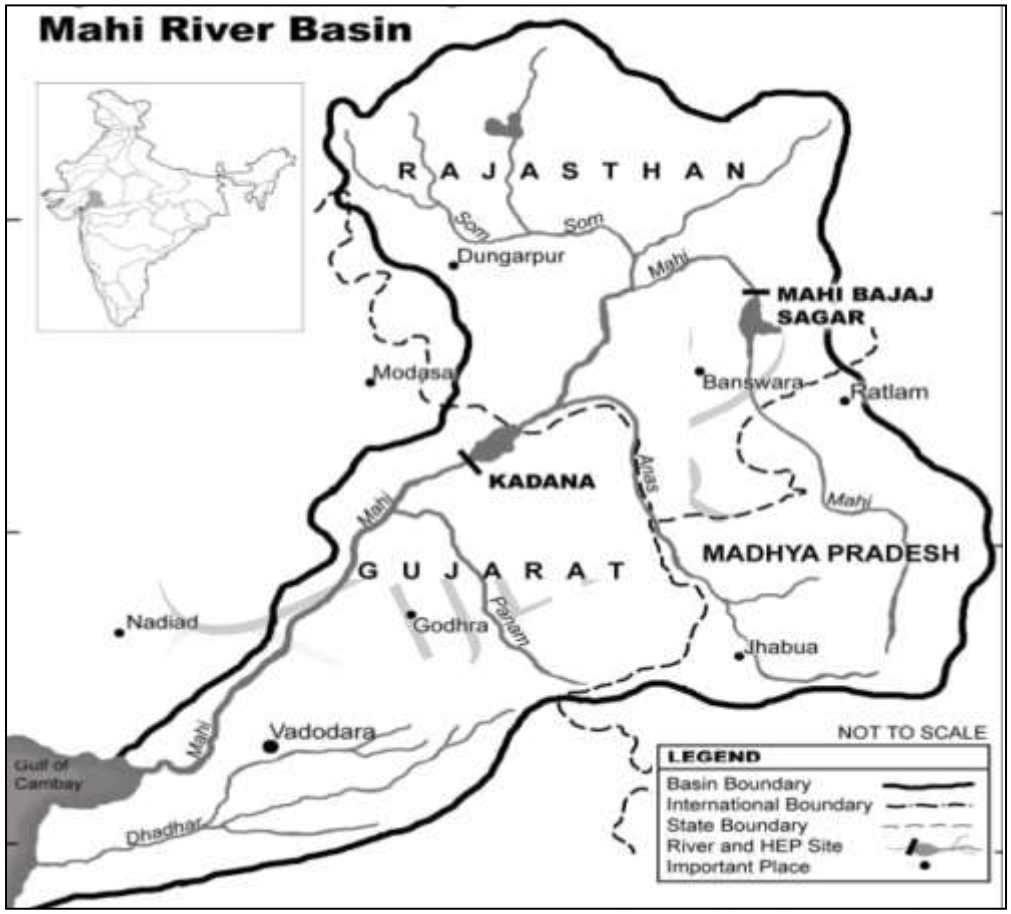
SARDAR SAROVAR PROJECT: A LIFELINE OF GUJARAT

- Yield of cotton – increased from a 130 kg/ha in 1949-50 to 624 kg/ha in 2006-07
- Yield of wheat - creased from 300 kg/ ha to 2100 kg/ ha - yield in almost all the crops increased
- Agricultural production gone up from 10.5 million tons in 1990-91 to 25.3 million tons in 2010-11
- Percentage share of Gujarat in food grain production of India was 2.8% in 1990-91 whereas 4.2% in 2010-11

- Irrigation command area - 1.8 million hectare
- Domestic water - 6 big cities, 169 towns and 9104 villages (80% of domestic water requirement)
- Energy saving of 1350 MW due to reduced groundwater extraction (water consumed for electricity generation - 228 MCM of water saving per year)
- Hydropower generation of 1 billion units per year with the installed capacity of 1450 MW – large saving of carbon footprints

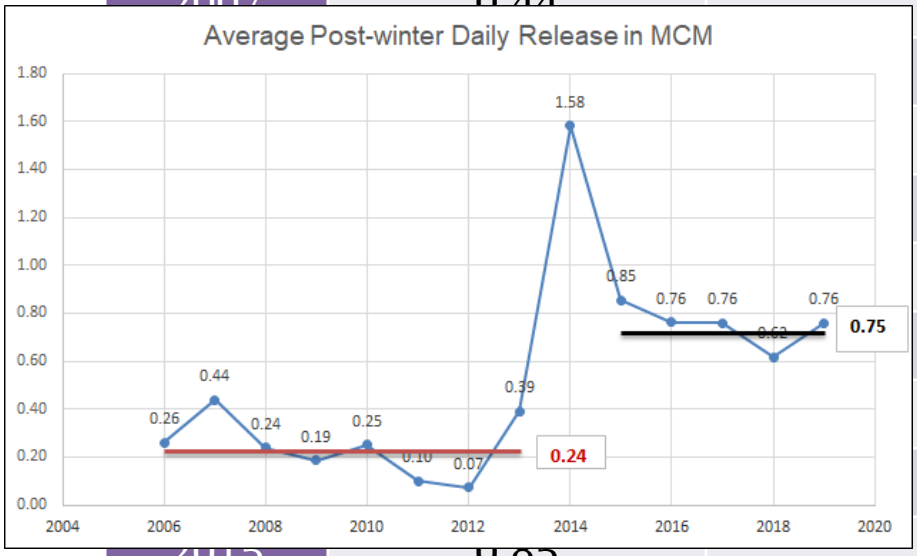
Service to Mankind and Ecology

DAMS OF MAHI BASIN



- Dams in Gujarat and Rajasthan serve irrigation water to more than 0.5 million hectare and satisfy domestic water requirement of over 8 million people besides hydropower generation
- Drought management and Flood control

Year	Average Post-winter Daily Release in MCM	Annual Estuarine Fisheries Production in MT	Average Long Term Annual Estuarine Fisheries Production in MT
2006	0.26	394	1233
2007	0.44	444	
2008	0.24	2072	
2009	0.19	1686	
2010	0.25	1760	
2011	0.10	1061	
2012	0.07	1216	
2013	0.39	1342	
2014	1.58	2309	2268
2015	0.85	2246	
2016	0.76	2306	
2017	0.76	2211	
2018	0.62	2280	
2019	0.76		



Month and Year	TDS (Acceptable up to 450 ppm)	Conductivity (Acceptable up to 1000 µS/cm)	Magnesium hardness (Acceptable up to 110 ppm)	Total Hardness as CaCO3 (Acceptable up to 215 ppm)
Feb-13	629	1173	206	390
May-13	748	1396	434	560
Jan-14	1178	2198	818	1022
Feb-15	1170	2182	492	700
May-15	1190	2220	484	700
Jan-16	150	280	84	130
May-16	266	496	118	188
Jan-17	254	473	80	154
May-17	242	451	84	148
Feb-18	265	494	86	150
May-18	270	502	80	160
Feb-19	280	523	100	166
May-19	277	517	80	150

Conclusion

Dams are Assets for Mankind and Ecology

- Role of dams in generating hydropower replacing conventional energy is if considered, saving in water footprints and carbon footprints would substantiate the need of dams
- If benefit of surface water over groundwater is appreciated in the form of electricity saving, a larger saving in water footprints and carbon footprints would further justify the role of dams
- Ecological contribution of dams has been scarcely viewed in this regard
- Country like India needs to focus on a fine balance between water conservation and ecology so as to address the issues related to food security and frequent extreme events due to climate change for which dams can play a vital role

THANKS