‘Ek Bharat Ek Shreshta Bharat’

: Jal Shakti

Reducing Water Consumption in Agriculture

: JAMMU and SRINAGAR

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NATIONAL WATER MISSION

NATIONAL WATER MISSION
MINISTRY OF WATER RESOURCES, RD & GR
GOVERNMENT OF INDIA

Goals of NWM

Comprehensive water data base in public domain and assessment of impact of climate change on water resources

Promotion of citizen and State action for water conservation, augmentation and preservation

Focused attention to vulnerable areas including overexploited areas

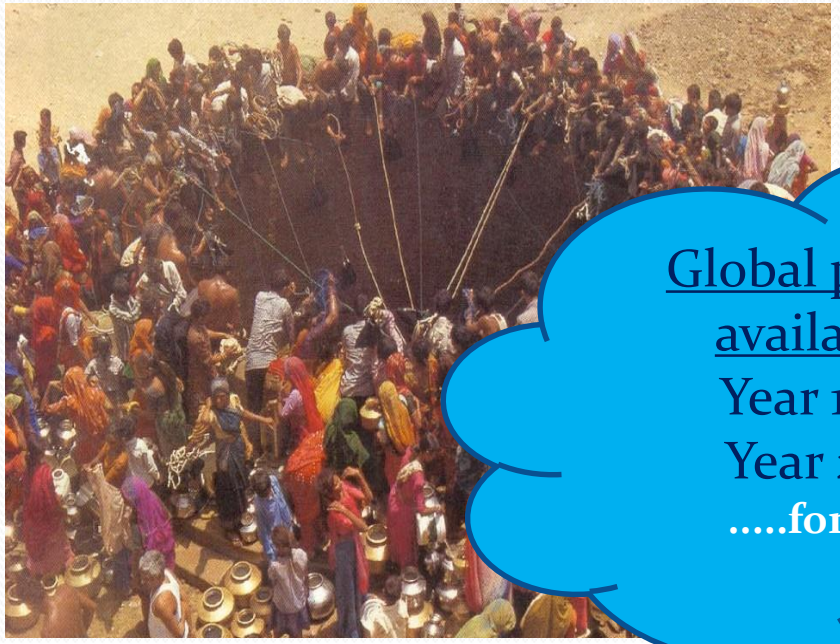
Increasing water use efficiency by 20%

Promotion of basin level integrated water resources management

Water Availability in India

Particulars	Quantum	
	BCM*	%
Precipitation received	4000	100
Water Resource Potential	1869	46.7
Utilizable Water Resource	1123	28.1
Ground Water	**433**	**10.8**
Surface Water	690	17.2

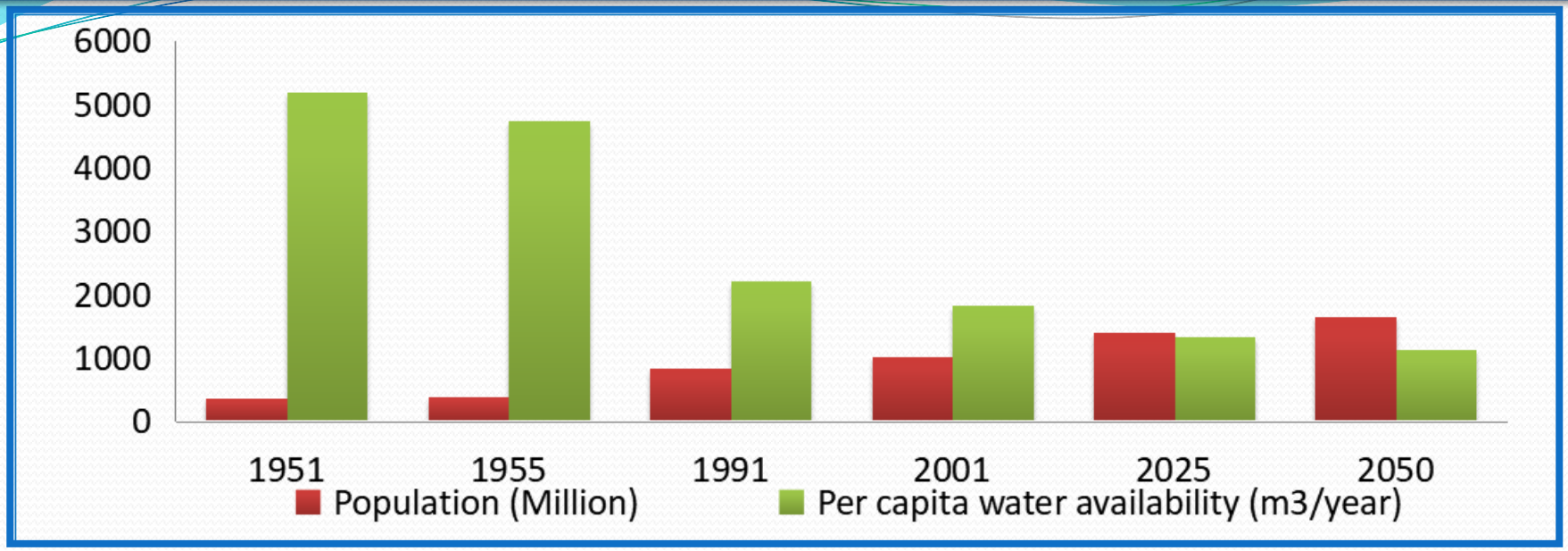
- Space & time related variability
- Per capita availability !

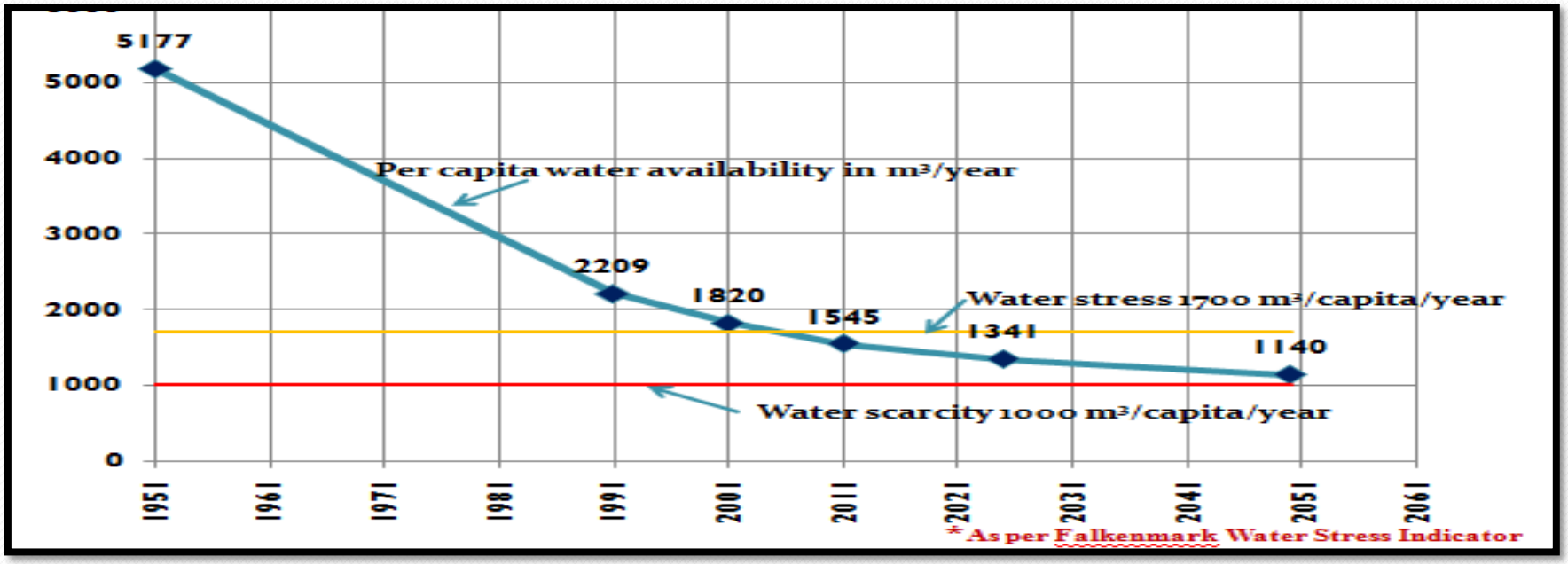


Population-2017
Global: 7.6 Billion
India: 1.34 Billion
(17.6%)

Global per capita annual availability of water:
Year 1804: 42,370 M^3
Year 2017: 5,575 M^3
.....for India: 1400 M^3

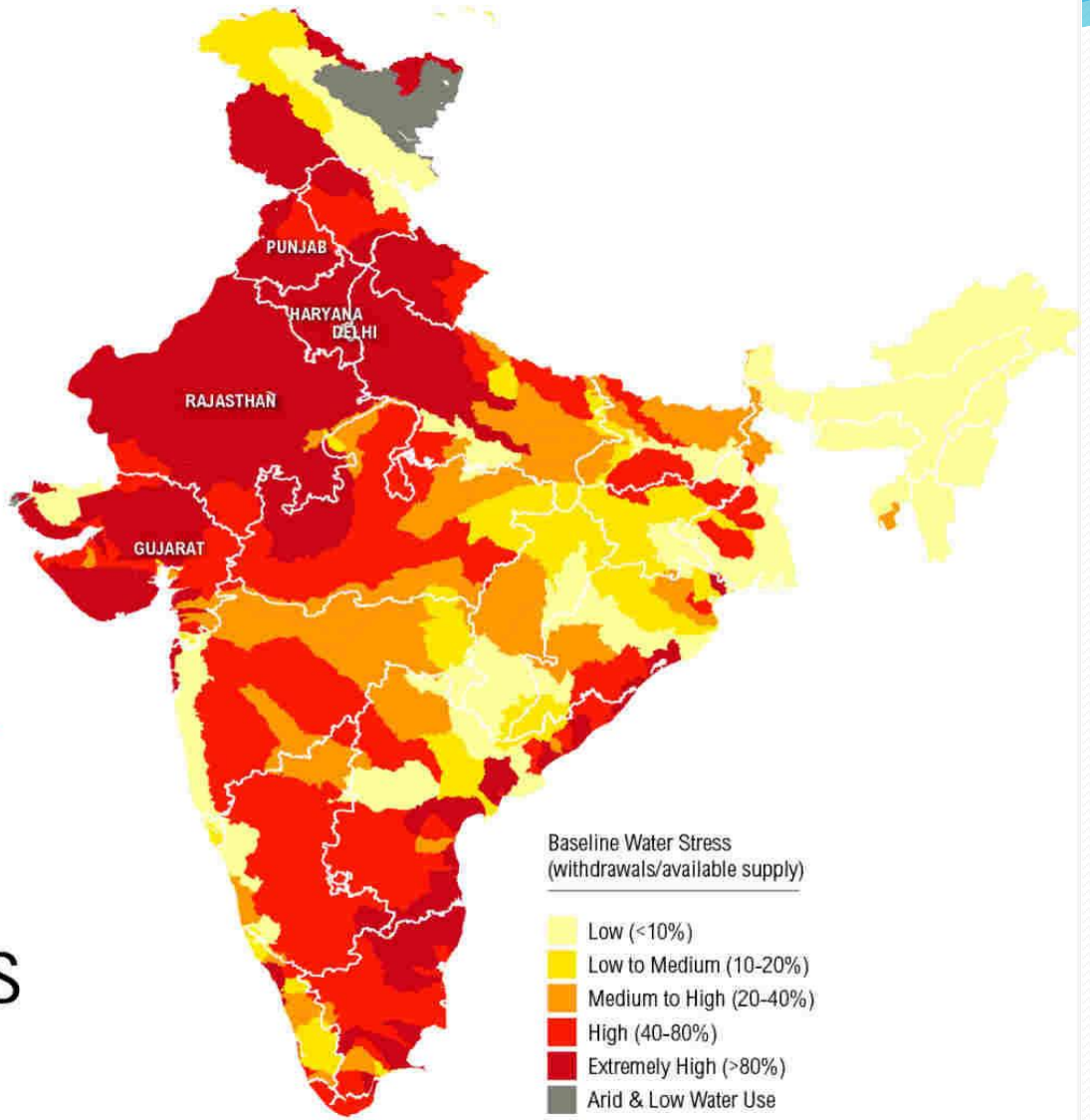
How much do we have ?





54%

of India Faces **High** to **Extremely High** Water Stress

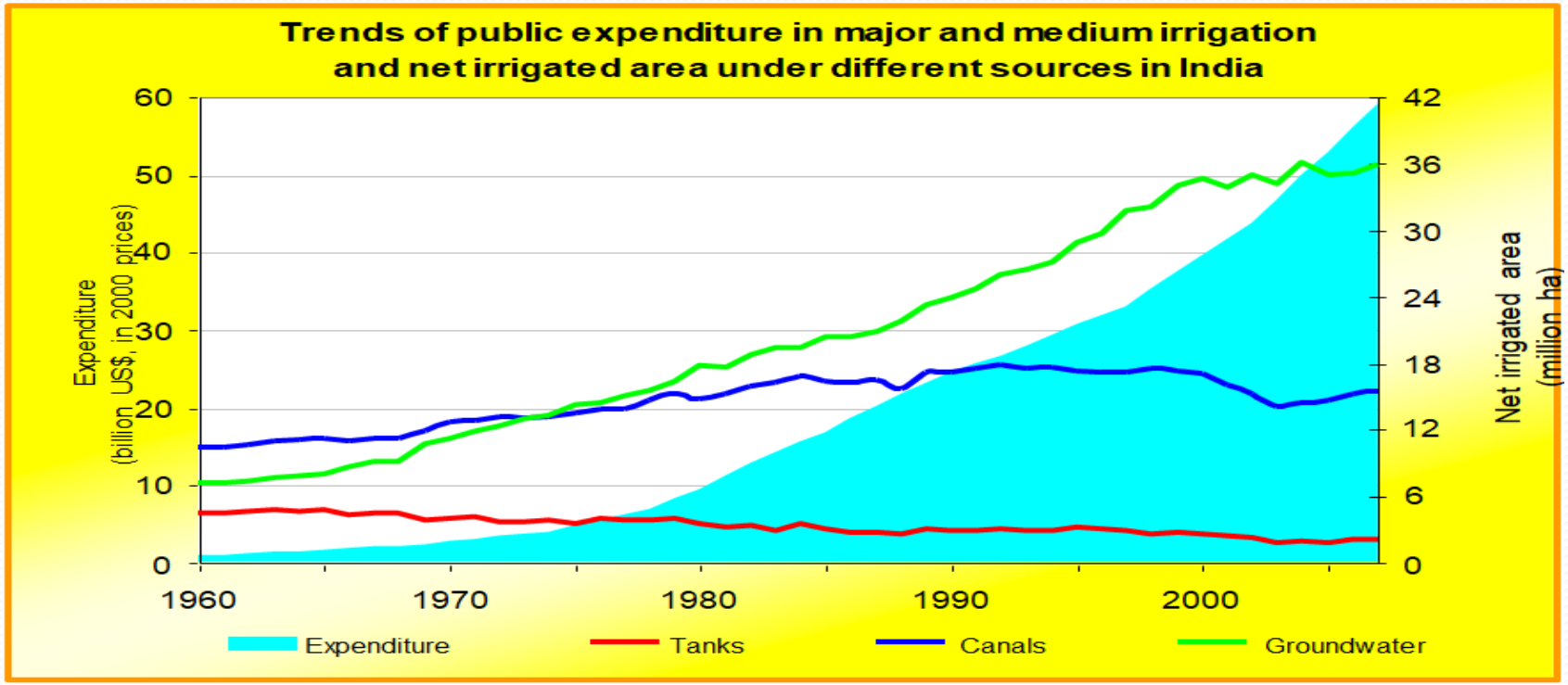


www.indiawatertool.in

WORLD RESOURCES INSTITUTE

Water Use

Usage (%)	World	Europe	Africa	India
Agriculture	69	33	88	89
Industry	23	54	5	11
Domestic	8	13	7	



Country	Water footprint of crop production (Gm^3/yr)			
	Green	Blue	Grey	Total
India	**716.0**	**231.4**	**99.4**	**1047**
China	623.9	118.9	223.8	967
USA	612.0	95.9	118.2	826
Canada	120.3	1.6	18.2	140
Pakistan	40.6	74.3	21.8	137
World	5771	899	733	7404

Increasing Water Use Efficiency

- Increase yield per unit of water by-
  - **(a)** Improving **non-water inputs** that increase production per unit of water consumed
  - **(b)** Changing to **new/ different crop varieties** with higher yield per unit of water consumed.
- Reduce non-beneficial depletion and increase the intensity of water use by-
  - **restricting evaporation** from bare soil and from fallow land and **reducing water flows to sinks** (deep percolation and surface runoff) and
  - **minimizing salinization** of recoverable return flows

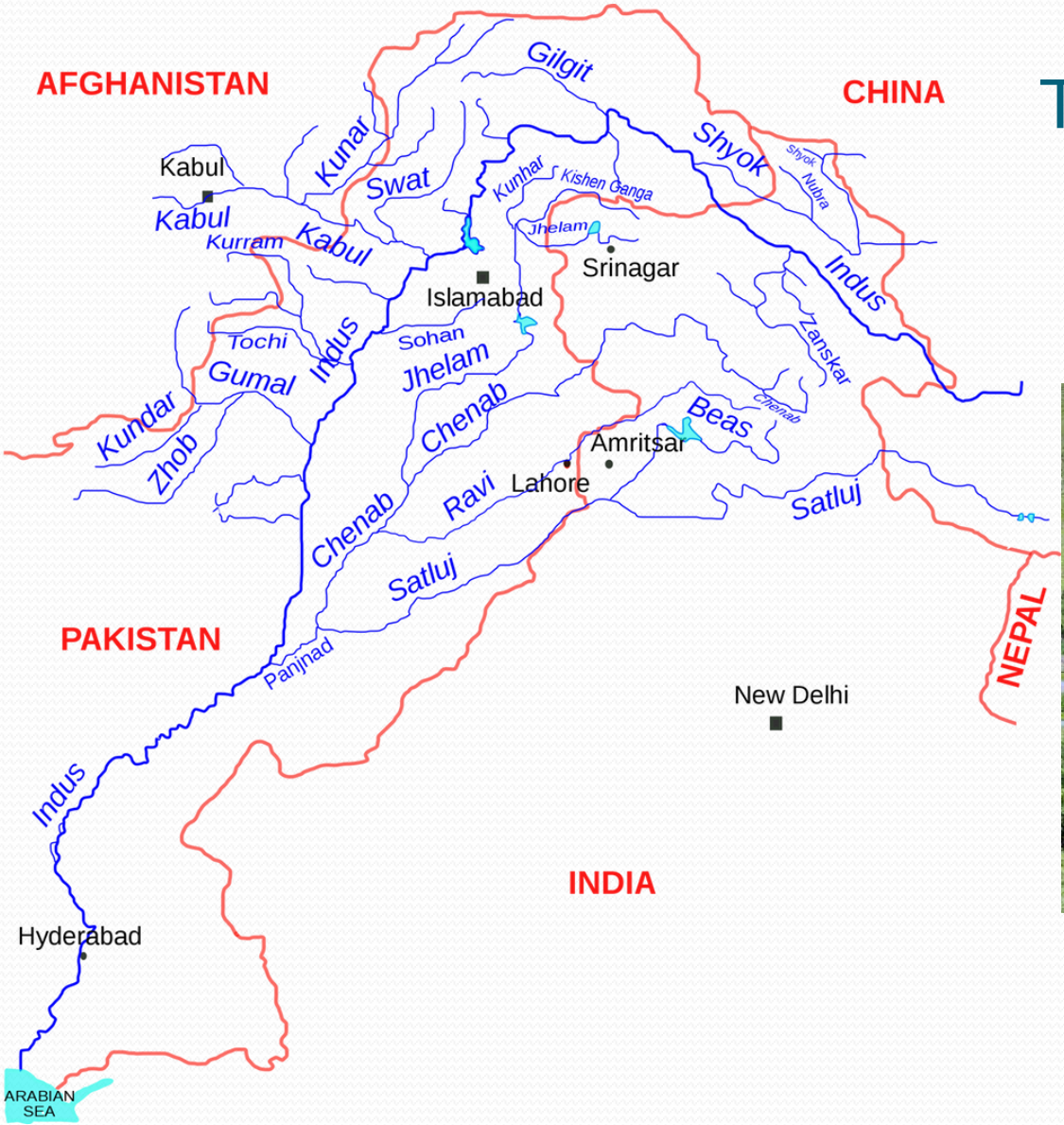
Increasing Water Use Efficiency (2)

- Reallocating water from lower
  - to higher value uses within or between sectors
  - Co-manage water by promoting multiple uses
- Better Storage, Conveyance, distribution efficiencies
- Mantras of 3Rs
  - -**Reduce**
  - **-Reuse**
  - **-Recycle**

Jammu

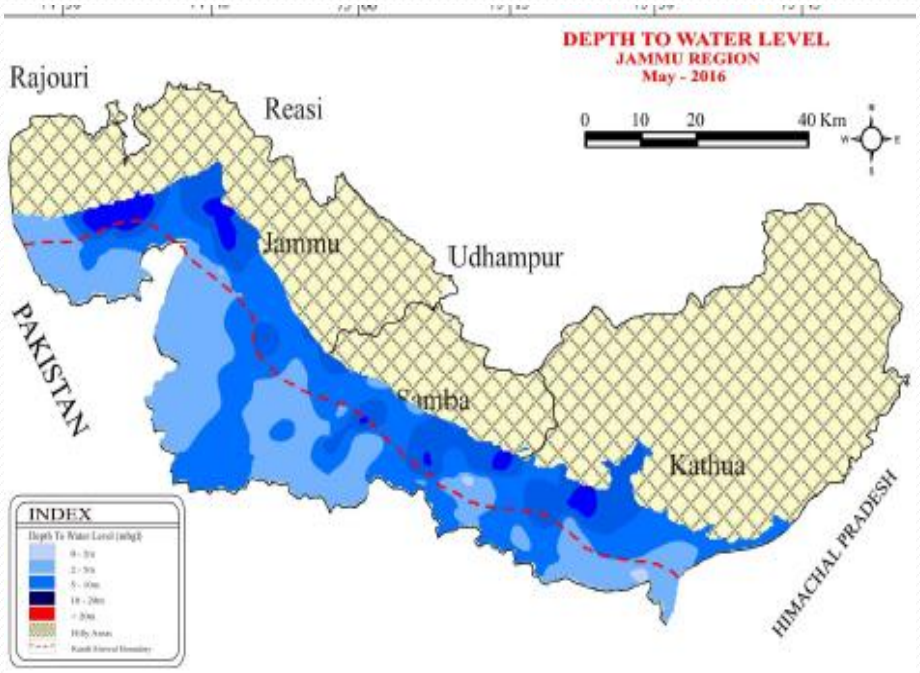
- With a total **geographical area** of 2342 sq km, the district comprises of 5 *tehsils* (*Jammu, R.S. Pura, Akhnoor, Samba, and Bishnah*)
- With 12.16% of the total population, it's the **most populous district** in the state with over 1.5 million people
- The **climate** here is classified as 'sub-humid' to 'sub-tropical' with daily temperature ranging between 24.90C and 41.70C
- **Rainfall** in the region is the highest in July and August and is minimal in November
- **Humidity** is lowest in May- 26% and maximum in December and January- 89%.

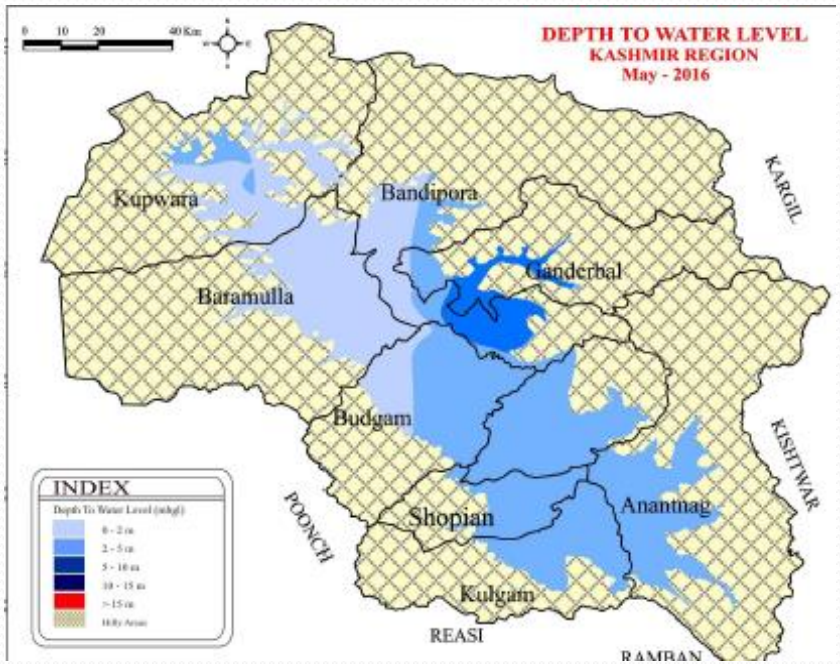
The District of **JAMMU**



River Profile of the Jammu Valley

Depth to water level in Jammu vs Kashmir



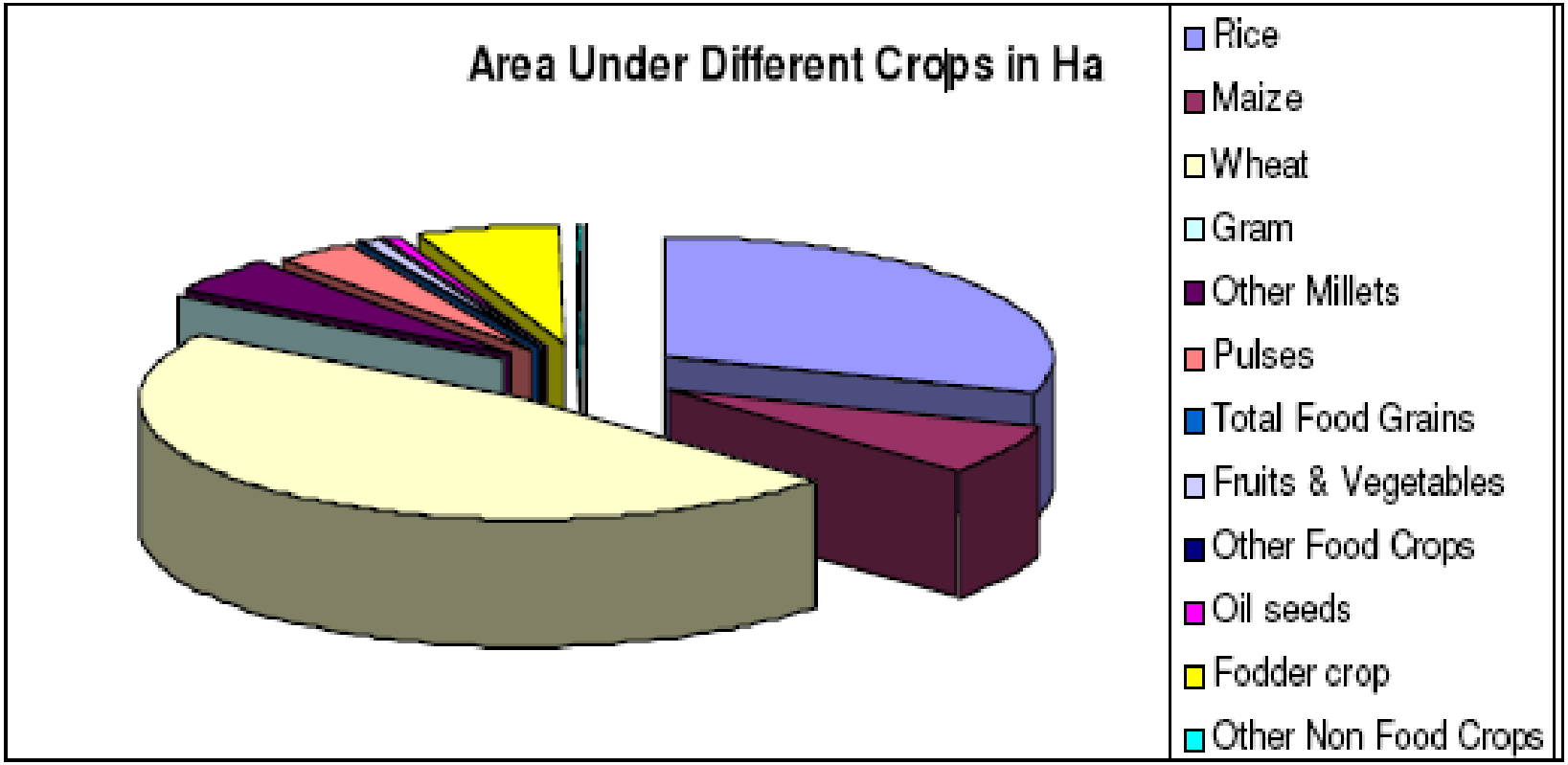


Water Resources in Jammu

- Surface Water: **major rivers** in the district are: Basantar, Jhelum, Indus, Chenab, Ravi and Tawi- of which the first 4 are now declared as '*national waterways*'
- Rivers and all seasonal tributaries act as major drainage lines
- Groundwater: Annual GW recharge exceeds the extractable volume of water.
- Of the 0.2 billion cubic meters, current extraction- **41% goes to irrigation**, 47% to domestic use and 12% to industrial use

- **Agriculture** is an challenge due to 1/3rd area being hilly terrain, with 62.53% of the total area is under cultivation- net sown area is only 37%
- Types of soil found are Mountainous and Loamy- largely **Alluvial Soil** rich in nitrogen content and organic matter
- **Crops suited**: rice, wheat, cotton, jute, sugarcane, tobacco, oilseeds, fruits and vegetables
- **Principle crops** include Paddy and Wheat; followed by Maize, Oilseeds, Fruit and Fodder crop

Crop Profile in Jammu



Source: Digest of Statistics 2008-09

Kashmir

- With the **population** of 12.5 million, Kashmir has a Temperate-cum-Mediterranean type of **climate** with average annual precipitation is 660 mm
- In winters, **rainfall** occurs from the western disturbances (temperate cyclones).-fairly widespread locally known as *Alamgir*
- About 65% of the precipitation occurs in the form of snow during winter season (Dec-Feb)-The mercury drops between -8ºC and 12ºC
- Soil profile here also **Alluvial soil-** high in silt

- Kashmir has about 2 lakh karnals of cultivable land with a **net sown area of 3.5 lakh hectares**

AGRICULTURAL STRESS IN KASHMIR

- Agriculture only contributes to 17% of the SGDP with 70% population dependency on it
- Over 20% of agricultural land has been converted to commercial/ residential use
- With the loss of flood basins, the state is experiencing unprecedented flooding
- Recession of Himalayan glaciers is reducing discharge into the rivers

Major Issues in the Water-Agriculture Nexus

- Although sources of water are abundant in the state- **Infrastructure for Water Use** is lacking- towards effective encatchments and storage
- **Limited irrigation opportunities** due to the hilly terrain requires intervention in terms of effective water use and avoiding water guzzling crops such as Paddy
- Low efficiency in agriculture has led to the **foodgrain shortage** to climb upto 82% from 32% in 1950-51
- **Low adoption of HYV seeds,** currently around 15% among local farmers

Recommendations

- In valley areas, in addition to traditional ground water structures shallow to **medium depth tube wells can be constructed** for developing the ground water resource.
- Since perennial *nallas* are major sources of water. **Shallow to medium depth bore wells** fitted with hand pump are useful ground water structures for domestic needs
- **Traditional resources like springs need to be revived developed** & protected. The discharge of such springs can be sustained by construction of small check dams or subsurface dykes across tributaries downstream
- **Small ponds/tanks/talavs can be utilized for recharging ground water;** and can contribute to harvesting water and for meeting domestic needs.

‘Sahi Fasal’

नहीं है जल , तो नहीं फसल । कम जल ले, वो "सही फसल"

SAHI FASAL campaign was launched by NWM to address the challenge - ‘**how to grow more agri-produce with less water on a sustainable basis**

SAHI FASAL is to **NUDGE** the farmers to go for crops which :

- Use very less water,
- but use it very efficiently; and
- are remunerative to them; at the same time
- are nutritious;
- are suited to the agro-climatic-hydro characteristics of the area; and
- are environmentally friendly

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‘Sahi Fasal’

- Was launched with a workshop on 14 Nov 2019 in Amritsar, which saw participation of over 850 farmers and field functionaries
- 2nd workshop in New Delhi on 26-27 November 2019 with agriculture and water management experts
  - 3 technical sessions - Crop Economics; Crop Diversification; Integrated approach for increasing Water Use Efficiency (WUE)
  - Key note address by Dr Walter Jehne, an eminent soil microbiologist form Australia propagating the concept of Soil-Carbon sponge

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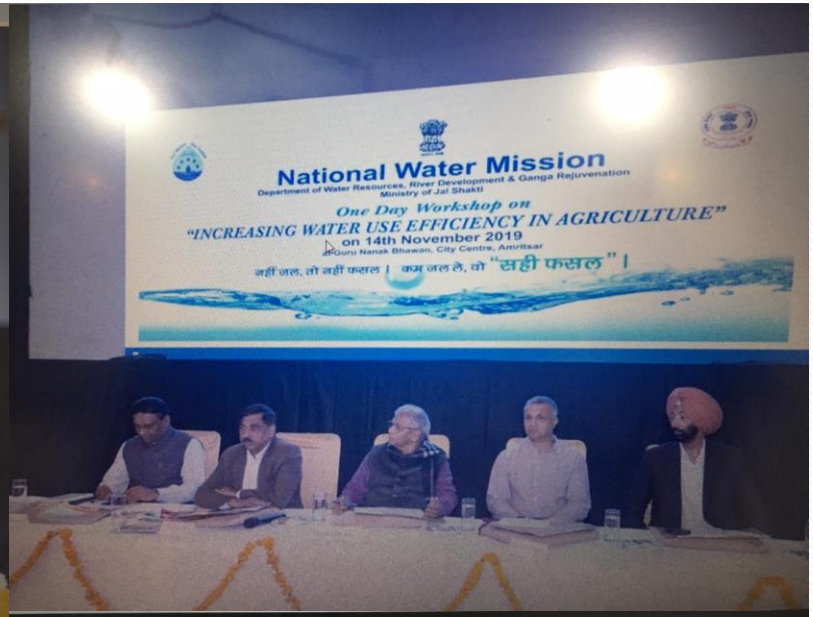
Amritsar and Scope Complex Workshops




National Water Mission
Department of Water Resources, River Development & Ganga Rejuvenation
Ministry of Jal Shakti
Workshop on
"INCREASING WATER USE EFFICIENCY IN AGRICULTURE"
on 26 & 27 November 2019
Dr. Ashok Dalwai
Dr. Walter Jehne
T. Vijay Kumar


Crispino Lobo
G. Asok Kumar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Dr. D. V. Raidu
G. Asok Kumar
Dr. Alok Sikka

Water use (mm) under different methods

	Flood	Drip	Sprinkler	LLL
Cotton	450	250	—	—
Groundnut	600	350	450	—
Soyabean	670	375	500	—
Wheat	450	—	300	—
Bajra	400	—	300	—
Tur	500	275	—	—
Jowar	400	—	300	—
Gram	240	130	150	—
Barley	400	—	300	—
Sugarcane	1600	—	1040	—
Rice	1000	—	—	750
Rice	1500	—	—	1200
Maize	650	—	450	—

Alternative Irrigation and other methods to improve Water Productivity

	Situation	Yield	WP
Philippines (avg 1988-89)	Flooded	5.25	0.245
	AWD	**3.95**	**0.455**
China (1999-2000)	Flooded	8.25	0.91
	AWD	**8.20**	**1.01**
India (1983-84)	Flooded	6.3	0.325
	AWD 1d	5.85	0.345
	AWD 3d	**5.55**	**0.35**
	AWD 5d	5.10	0.335
	AWD 7d	4.90	0.325

*Under **AWD***

- Alternative Wetting and Drying (AWD)
- Dry direct seeding of rice
- Raised beds for Rice-Wheat rotations
- Aerobic rice for improving water productivity
- Chanel to field v/s Field to field irrigation

Policies to reduce groundwater overexploitation

Control Policy instruments	Cost-effectiveness	Impact	
		Equity	Sustainability
i) Well spacing norms	Less costly to enforce	Inequitable	Very limited impact on sustainable use
ii) Volumetric limits on pumping	Costly	More equitable	Highly effective for sustainable use of water and electricity
iii) Electricity pricing	Less costly	Equitable	Limited impact on sustainable use of water and electricity
iv) Electricity rationing with pricing	Costly	Equitable	Highly effective on sustainability
v) Regulation on well digging and deepening	Costly	Inequitable	Limited impact on sustainability
vi) Credit restriction	Less costly	Inequitable	Very limited impact
vii) Crop restriction	Costly	Inequitable	Very limited impact

Suggestions to conserve water

- **Roof Top Rain Water Harvesting practices must be adopted** in hilly areas since the district receives ample rainfall-but it is mostly getting wasted as runoff

  RTRWH in particular is an ideal solution for augmenting water resources particularly in hilly & chronic water scarce areas.
- Water stupas as promoted in Laddakh in snow bound areas
- **Mining of riverbeds should be prohibited** as it leads to fall in the water levels & it also damages natural river system

Suggestions to conserve water (2)

- **Create awareness among masses for water conservation and augmentation,** proper waste disposal and for protecting water sources.
- Aerators to be used in taps to reduce wastage
- **People's Active participation**.
  - People should be made aware about the value of water
  - It will help in proper utilization and conservation of the water resources available.
  - Grass root level efforts are required for proper implementation of development programme.

Thankyou !

About *'Ek Bharat'* and **NWM**

- **Main Objective:** To bring National and State level organizations on the same platform to share experiences in 'Rejuvenation of Rivers'

- *Jal Shakti and Disaster Management Practices* aims to "Reduce Water Consumption in Agriculture"

SCBA under Drip Irrigation

Particulars	Over-exploited region (Rs.'000 / ha/year)		Semi-critical region (Rs.'000/ha/year)	
	With subsidy	Without subsidy	With subsidy	Without subsidy
Private costs and benefits				
Private cost	77	81	50	55
Private benefit	256	251	137	132
External costs and benefits				
Value of water saving	149	149	77	77
Reduced power consumption	25	25	14	14
Reduced well failure and cost of well deepening	7	7	2	2
Total external benefits	181	181	92	92
Social cost	77	81	50	55
Social benefits	437	432	229	225
Social benefit cost ratio (5% discount rate)	4.94	4.71	4.34	4.01

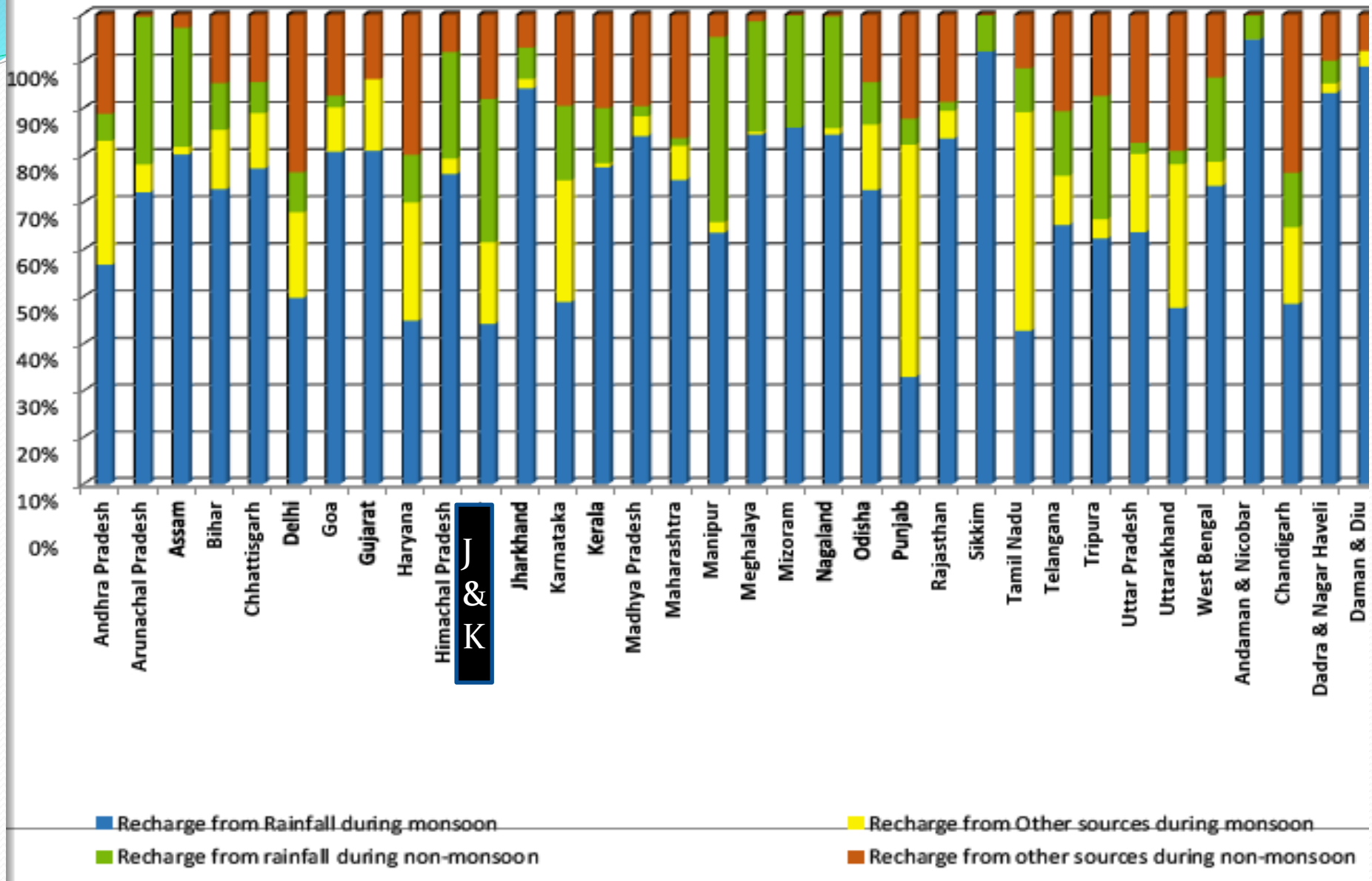

Fig.6.2 State wise contribution of recharge components in Total Annual Ground Water Recharge of India, 2017