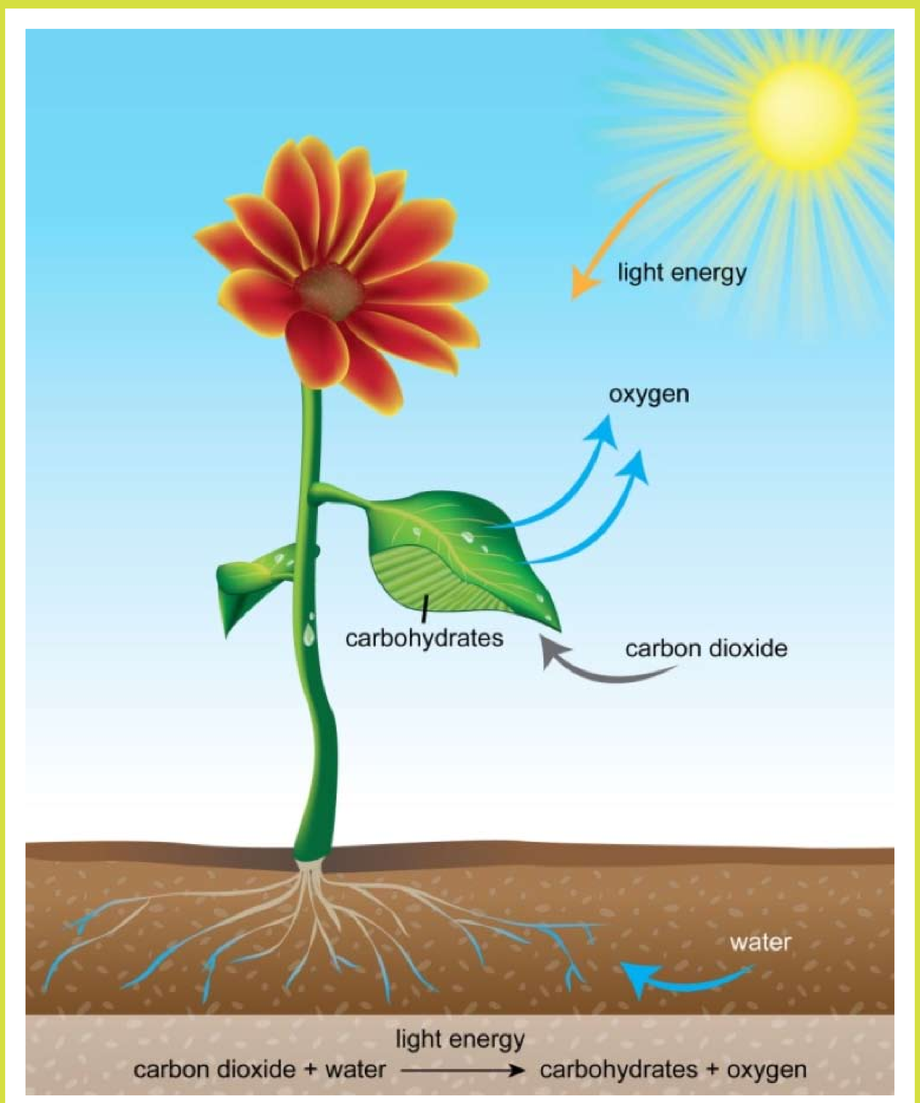
Integrated River Basin Management (IRBM)

Burning Issue for the Earth: Climate change and major culprit of it is increasing CO_2 in the atmosphere.

Solution for Mitigating Climate Change: Promoting PHOTOSYNTHESIS to consume CO_2

Landscape Approach for promoting photosynthesis: INTEGRATED RIVER BASIN MANAGEMENT



Farms, forests, water bodies and settlement are not isolated elements, but part of a wider landscape in which all land uses are integrated. A landscape approach entails viewing and managing multiple land uses in an integrated manner, considering both the natural environment and the human systems that depend on it.

IRBM is the process of coordinating conservation, management and development of water, land and related resources within the river basin, in order to maximize economic and social benefit while preserving and where necessary restoring freshwater ecosystems.

Better Soil & Water Management

▼

More Vegetation & Green Cover

▼

More Photosynthesis

▼

CO_2 fixation

Soil Health Management

▼

Promoting Waste Recycling for Composting

▼

Better Animal Waste Management

▼

Less Methane Generation

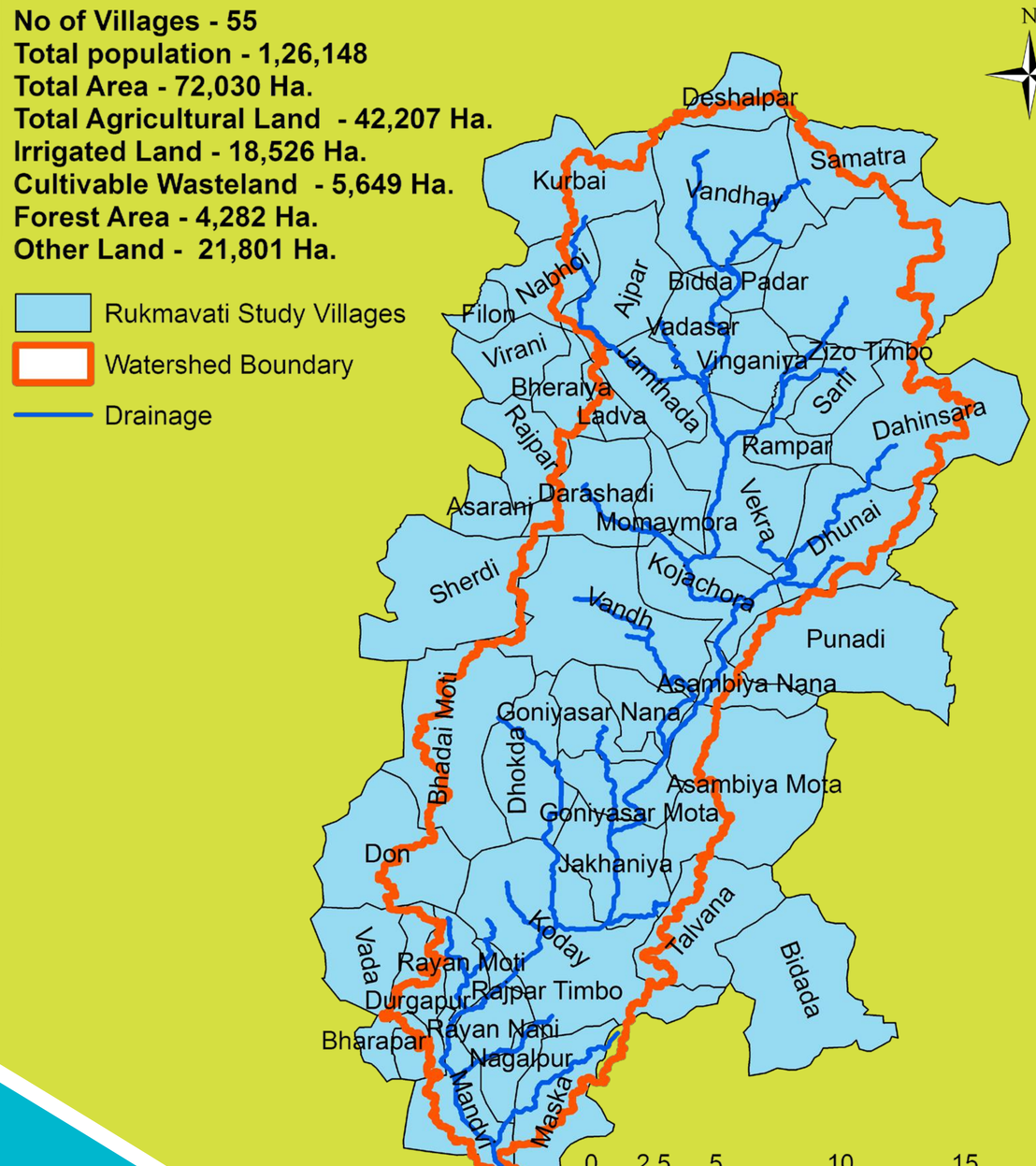
▼

Mitigation leads to Positive Impact on Climate change

Rukmavati River Basin

Casestudy from Kutch, Gujarat

No of Villages - 55
Total population - 1,26,148
Total Area - 72,030 Ha.
Total Agricultural Land - 42,207 Ha.
Irrigated Land - 18,526 Ha.
Cultivable Wasteland - 5,649 Ha.
Forest Area - 4,282 Ha.
Other Land - 21,801 Ha.



Water Resource Management (Hydrology):

New check dams – 107,
Storage capacity - 40 Million Cubic Feet,
Beneficial farmers – 1692, Area under irrigation - 3784 hectares

Desilting in 84 structures and 504 hectares benefitting 379 farmers resulted in reduced requirement of chemical fertilizer.

50% saving in water through promotion of drip irrigation in 3684 Ha area.

Natural Resource Management

2000 MT waste converted to compost from 400 Ha of area by 750 farmers resulted in improvement in soil fertility

Promoting legume as inter crop – nitrogen fixation in soil and also providing food security (Nitrogen fixation - 103 MT in 3600 Ha (224 MT urea saving)

Animal husbandry

Pasture land development in 500 Ha of land to provide fodder security.

Farm bunding to conserve soil moisture and control soil erosion, in 64 hectares of land resulted in improvement of productivity by 8 – 10%.

Improving market linkage, 20% increase in income

Tree plantation

35,000 trees planted in basin area to improve greenery

Horticultural plantation of Date palm, Pomegranate, Mango, Ber, Banana and Papaya in 500 Ha to provide income to farmers.

Climate Change mitigation through CO_2 fixation

Procurement Satellite Image of LANDSAT October (2009 & 2014)

Pre Processing of Satellite Image

Geometric Correction
(Geo referencing)

Radiometric & Atmospheric Correction

Digital Number to Radiance

Radiance to Top of Atmosphere

Photosynthetically Active Radiation (PAR)=1/2 Total solar surface irradiance ($MJm^{-2}Yr^{-1}$)

Land Use/ Land Cover

NDVI (Normalized Vegetation Index)

FPAR (Fraction of Photosynthetically Active Radiation)

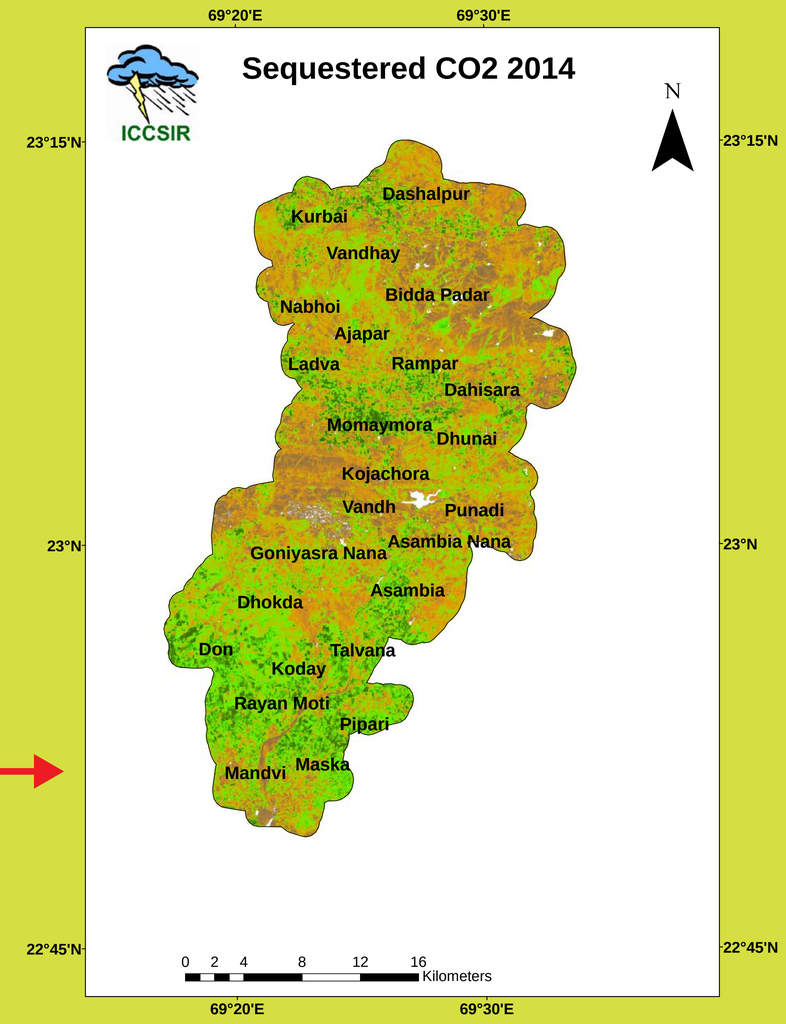
APAR (Absorbed Photosynthetically Active Radiation) **($MJm^{-2}Yr^{-1}$)**

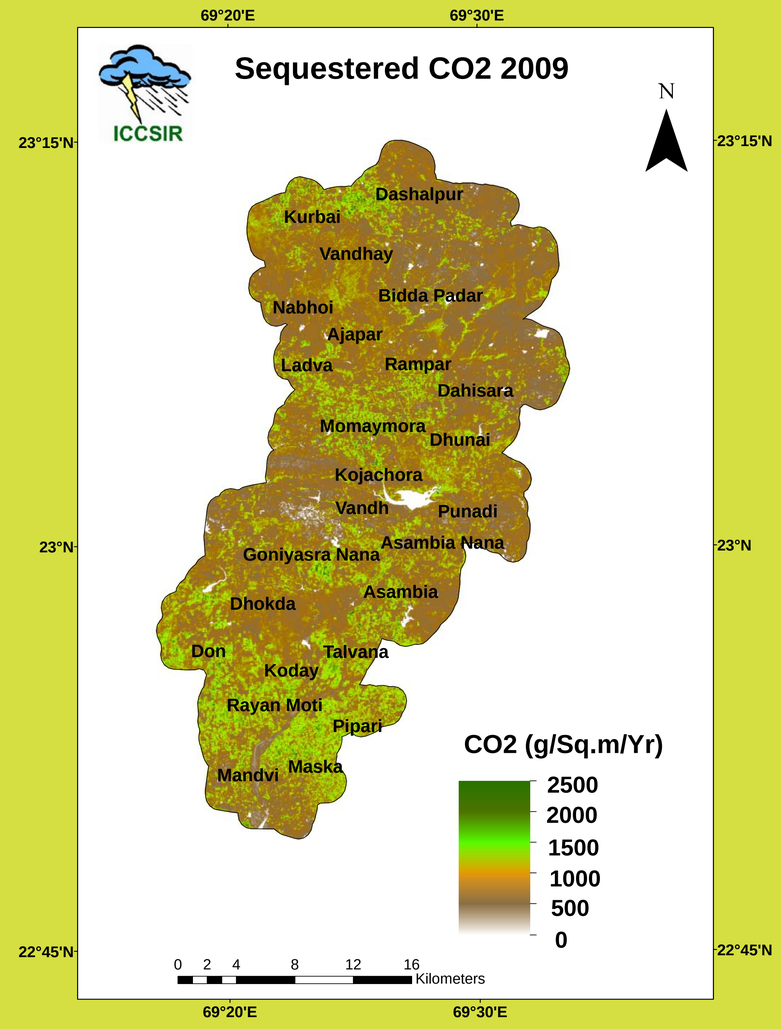
Light Use Efficiency ($gCMJ^{-1}$) $=\varepsilon_{max} * T1 * T2 * W$
ε_{max} : Maximum light use efficiency
T1 & T2 : Temperature plant growth scalars
W: Water Scalar

GPP
(Gross Primary Production)
($gCm^{-2}Yr^{-1}$)

NPP (Net Primary Production) = GPP-R_a (Total Respiration by plant) ($gCm^{-2}Yr^{-1}$)

Sequestered CO_2 $=NPP * 3.666 (g\ CO_{2m}^{-2}yr^{-1})$





Change in NPP and CO_2 Rukamavati River Basin

Rukmavati River Basin		NPP(tC)	Area (ha)	t CO_2	t CO_2/ ha
CLUSTER-1	2009 2014	29293 34542	11791 11795	107398 126640	9.1 10.7
CLUSTER-2	2009 2014	20530 25668	8165 8192	75270 94108	9.2 11.5
CLUSTER-3	2009 2014	24522 29103	9640 9798	89906 106700	9.3 10.9
CLUSTER-4	2009 2014	48827 60018	18126 18196	179015 220045	9.9 12.1
CLUSTER-5	2009 2014	21904 26764	7258 7259	80308 98126	11.1 13.5
Total	2009 2014	145078 176096	54980 55240	531898 645620	9.7 11.7

Value Added Agriculture

Grading, Packing & Marketing, SHG activities, Direct marketing for mango & dates, Producer Company

Women empowerment through micro finance activities: 68 Self Help Groups (SHGs) were formed and 840 women have initiated monthly saving and microfinance related activities. Till date saving of these women is around 1.5 million INR (Indian Rupees). This activity has developed leadership skills and social status upliftment for women.

Grading, packing & marketing of agriculture produce by SHGs: 240 MT

Mango marketing to end user: 60 MT

NCCSD

VRTI

EXCEL