



भूमि संसाधन विभाग
DEPARTMENT OF LAND RESOURCES
Government of India

Powering Rural Prosperity through Agri-Solar Cooperatives & Watershed Development



Importance of Watershed Development : A National Perspective

Particulars	World	India
<i>Per capita land</i>	1.75 ha	0.23 ha
<i>Per capita agricultural land</i>	0.18 ha	0.12 ha

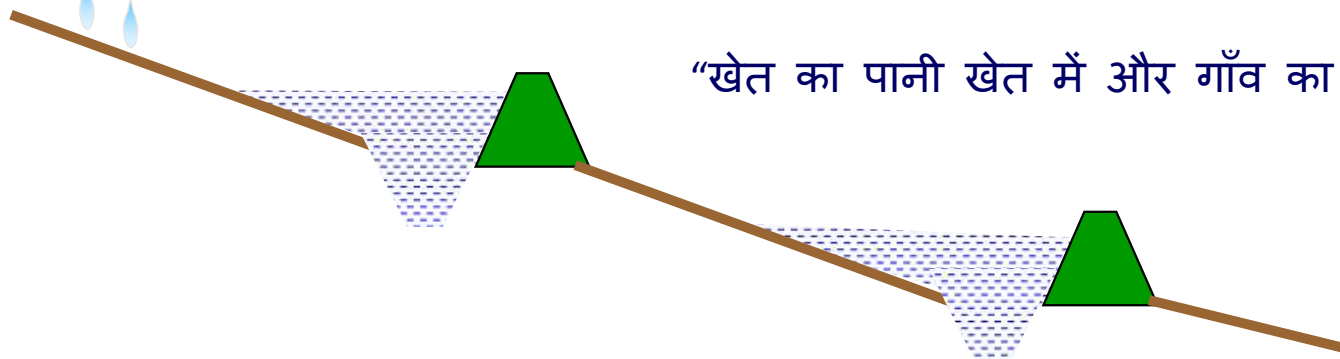
- Rainfed agriculture covers about 61.39 mha (43 %) of the net sown area of the country.
- Rainfed agriculture contributes about 40% of the food grain production.

Watershed Development - Technical Strategy



- Ridge-to-valley approach
- *In-situ* moisture conservation
- Reduce Runoff velocity
- Water harvesting structures with the approach of 'Water Budgeting'
- Fortification with vegetation
- Farming Systems Approach
- Change in land use

“खेत का पानी खेत में और गाँव का पानी गाँव में”



NRM Structures under WDC-PMKSY



End-line Evaluation of Completed WDC-PMKSY 1.0 Projects

IMPACT SO FAR:



Increase in
water table
upto **3 meters**,
even after taking
2nd or 3rd crop.



Increase in
crop intensity
upto **18%**



Increase in
cultivated area
upto **30%**



Increase in
milk production
upto **40%**



Increase in
average annual
income of farmers
upto **70%**



Challenges

Land Development Sector

- Increasing climate variability, including El Niño events, is aggravating Water stress, land degradation, and productivity instability.
- Untreated 5.6 cr. ha. rainfed area, posing a major risk to food security, farmers' income, and rural livelihoods.
- Need for a sustainable financing mechanism to accelerate watershed development.

Solar Sector

- Hurdles like land consolidation for large & medium scale solar projects.
- Effective utilization of solar power produced.





AGRI-SOLAR COOPERATIVES

Agri Solar Cooperatives (ASC)

A community-owned institutional model inspired by Dairy & Sugar Cooperatives



Core Idea of ASC

- Farmers pool land voluntarily and form a cooperative society
- Private solar developer installs agrivoltaics
- Power sold to DISCOM / Private Sector or used as captive power for local needs

Land rent shared:

- 50% → Individual Farmer
- 50% → Cooperative Society Fund
- Cooperative fund reinvested into watershed development works

Synergy of Watershed Development with Agrivoltaics

1. Installation of Agrivoltaics in rainfed and drought-prone areas will be more remunerative if rainwater is harvested effectively.
2. Farmers in these areas can take a 2nd & 3rd crop or can go for crop diversification with high value / horticultural crops, with the support of protective irrigation.

Expected Outcomes

- Enhanced water security in rainfed regions & Affordable clean energy.
- Increased farmer incomes and diversified revenue streams.
- Watershed sustainability shifts from *grant-dependent* to *income-backed*.
- Farmers become asset owners/shareholders, not mere land lessors.
- Local youth will get employment as “Solar/Sour Mitra” for O&M of agrivoltaics..
- Facilitating PURA (Providing Urban Facilities in Rural Areas).
- Accelerated progress towards:
 - Land Degradation Neutrality
 - Doubling farmers’ income
 - 500 GW renewable energy target
 - Cooperative-led rural economy



Agrivoltaics & Watershed Development Powered Data Centres

- Growing AI and digital economy
- Agrivoltaic clusters in rural areas
- Decentralisation of digital infrastructure beyond major metropolitan centres
- Greater availability of renewable electricity and water for data-centre operations
- Better utilisation of renewable-energy potential in rainfed regions
- New opportunities for local employment and services
- Potentially reduced pressure on urban infrastructure and land
- Development of rural economic clusters

Key Planning Assumptions

Parameter	Assumption
Total Project Area	5,000 ha
Watershed treatment coverage	100% (5,000 ha)
Proposed area to be used for solar installations	~2.5 % of total area (~125 ha)
Agrivoltaics land requirement	~2.50 ha per MW
Annual Land Lease Revenue to Farmers (50 % will be credited to individual farmers & 50 % to SAC)	₹1.25 Cr. Per year (For 125 ha. @ ₹1.00 Lakh per ha. per year)
Total Agrivoltaics capacity	50 MW
Costing of Agrivoltaics establishment	₹250 Cr. (For 50 MW @ ₹ 5 Cr/MW)
Project life for revenue estimation	25 years

Entity	Benefits: Estimated Value / Impact
Solar Developer	Easier land consolidation for Agrivoltaics at Lower Lease Rent
Farmer	Dual Income: land lease (₹ 2.5 Lakh) & Agriculture (₹ 5 Lakh) from 2.5 ha.
DISCOM	Procurement-Based Incentive: As per MNRE Norms
Agri Solar Cooperative	Part in land lease rental: 0.50 Lakh/year/ha.

- ✓ Once the efficacy of this model is established, the financials will be shaped by market dynamics. They may turn out better for all stakeholders than these projections
- ✓ Scaling up to 50 MW may bring down the capex for installation of Agrivoltaics solar panels.
- ✓ Smoother land consolidation will also greatly bring down entry point cost and will facilitate large-scale operations, maximizing revenues. Hence, the ROI in the Agrivoltaics model will definitely be higher than conventional (ground-mounted) solar units.
- ✓ ASC, in coordination with local FPO, will also play an important role in storage, processing, and marketing of agricultural produce.

Important parameter to be finalized

1. Assessing demand for solar energy from DISCOMs and the private sector.
2. The scope for establishing agrivoltaics in rainfed areas is to be worked out.
3. Average land rent (per ha.) for Agrivoltaics.
4. Land requirement (ha.) required per MW.
5. Government subsidy for Agrivoltaics.
6. Power consumption/selling options, DISCOM, Private sector & grid-related information.
7. Scope for establishment of Data Centre, allied IT infrastructure, etc. for captive utilization of Agrivoltaics-generated energy.

A Drought Free & Green Energy Powered India For Developed India

