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Q20

In what way micro-watershed development projects help in water conservation in drought-prone and semi-arid regions of India?

UPSC Civil Services Mains 2016 · GS I · 12 marks · World's Physical Geography

Salient features of world's physical geography.

Core demand of the question

- Explain how micro-watershed projects conserve water in drought-prone and semi-arid India
- Show the ridge-to-valley logic with field methods and limits

Revision summary

A micro-watershed is a small catchment managed ridge to valley.

Trenches, bunds, farm ponds, and check dams turn a short rain into soil moisture and well recharge.

The method fits Deccan hard rock and Rajasthan semi-arid belts that lack large rivers.

Village rules against ridge grazing and over-pumping decide whether the water stays.

Structures without upkeep silt up and do not abolish a true rain failure.

Introduction

Drought-prone and semi-arid belts, from the Deccan trap to Rajasthan, Bundelkhand, and parts of Telangana and Karnataka, get rain in a few violent spells. A micro-watershed treats a small catchment so that rain is slowed, spread, and sunk instead of running off as a flash flood and a dry well.

Body

What a micro-watershed is

- A watershed is the land that drains to a common point; a micro-watershed is a small unit, often a few hundred to a couple of thousand hectares, that a village can actually manage.
- **The method is ridge to valley:** treat the top first so that lower bunds are not buried by untreated runoff.
- In semi-arid India the aim is not a large reservoir so much as soil moisture, a recharged dug well, and a longer green period for crops and grass.

How the works conserve water

- Contour trenches, bunds, and graded bunds on the ridge intercept sheet flow, raise infiltration, and cut gully start.
- Vegetative filters, grassed waterways, and tree lines increase roughness so water stays on the land extra hours.
- Farm ponds and sunken pits store a part of the shower for protective irrigation at flowering, which is often the difference between a crop and a failure.

- Check dams, gabions, and nala bunds in the drainage line slow the stream, drop silt, and push water sideways into the aquifer.
- Repair of tanks and khadins, as in Rajasthan, uses traditional storage that fits sandy and rocky catchments.
- In-situ moisture practices-broad-bed furrow, mulching, and compartmental bunding-keep the rain in the root zone even without a big structure.
- Reduced runoff also means less soil loss, so the sponge of the field improves year after year, which is water conservation as land conservation.

Why this fits drought-prone and semi-arid regions

- These regions cannot count on glacier rivers; they must live on local rain.
- Hard rock Deccan and granite belts have limited aquifers; recharge through many small structures beats one deep bore that goes dry.
- Success stories from Ralegan Siddhi, Hiware Bazar, and many IWDP/IWMP blocks show wells rising and tanker visits falling when the village stops free grazing on the ridge and maintains the bunds.
- Livestock get more fodder from treated commons, which reduces distress sale in a drought year.

Limits and conditions

- A **check dam** without ridge treatment silts up; the project then looks like construction, not conservation.
- Upstream pumping can steal the recharged water if wells are not socially regulated.
- Very low rainfall years still fail; micro-watersheds reduce the frequency of misery, they do not abolish drought.
- Women's groups and landless users must share tank and well water, or the project only helps the larger farmer at the valley bottom.

Way forward for the answer

- Define the small catchment, list trench-bund-pond-**check dam** as the water path, and tie it to Deccan and Rajasthan drought belts with the warning about silt and equity.

Flow diagram

Ridge trenches bunds trees -> Slower runoff more infiltration
Slower runoff more infiltration -> Valley ponds check dams
Valley ponds check dams -> Soil moisture recharged wells
Soil moisture recharged wells -> Less drought tanker dependence

Conclusion

Micro-watershed projects conserve water in dry India by catching rain on the ridge, storing it in soil, ponds, and nalas, and feeding wells from the same shower that used to leave as a flood. They work when the village maintains the chain and shares the recharge, not when a single dam is dumped in the valley.

Facts & figures

Ridge-to-valley treatment

Sequence of starting soil and water works at the top of the catchment so lower structures are not silted at once.

IWMP / IWDP

Government watershed programmes that funded micro-catchment works in dryland districts.

Ralegan Siddhi / Hiware Bazar

Maharashtra village examples often cited for social rules plus watershed structures that raised wells.

Khadin

Rajasthan farm-pond or bunded field system that holds rainwater on gently sloping desert margins.

Check dam

Small barrier on a nala that slows flow, drops silt, and encourages local groundwater recharge.

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