



Reviving Himalayan Springs

Dhara Vikas- A learning by doing Initiative



MGNREGA Division
Rural Development Department
Government of Sikkim

www.sikkim-springs.gov.in



Water resources in the Himalaya

- **Glaciers**
- **Snow**
- **Rivers**



**Lowland
perspective**



- **Lakes**
- **Streams**
- **Springs**



**Mountain
perspective**



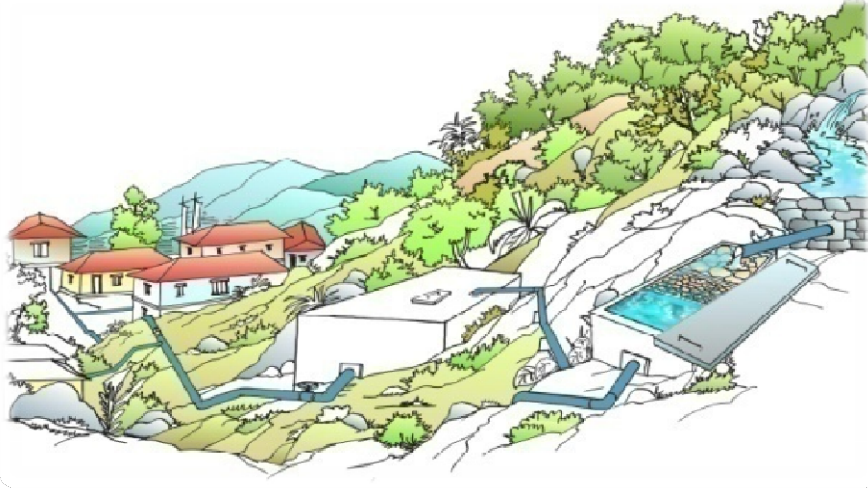
The dynamic problem

Lean season

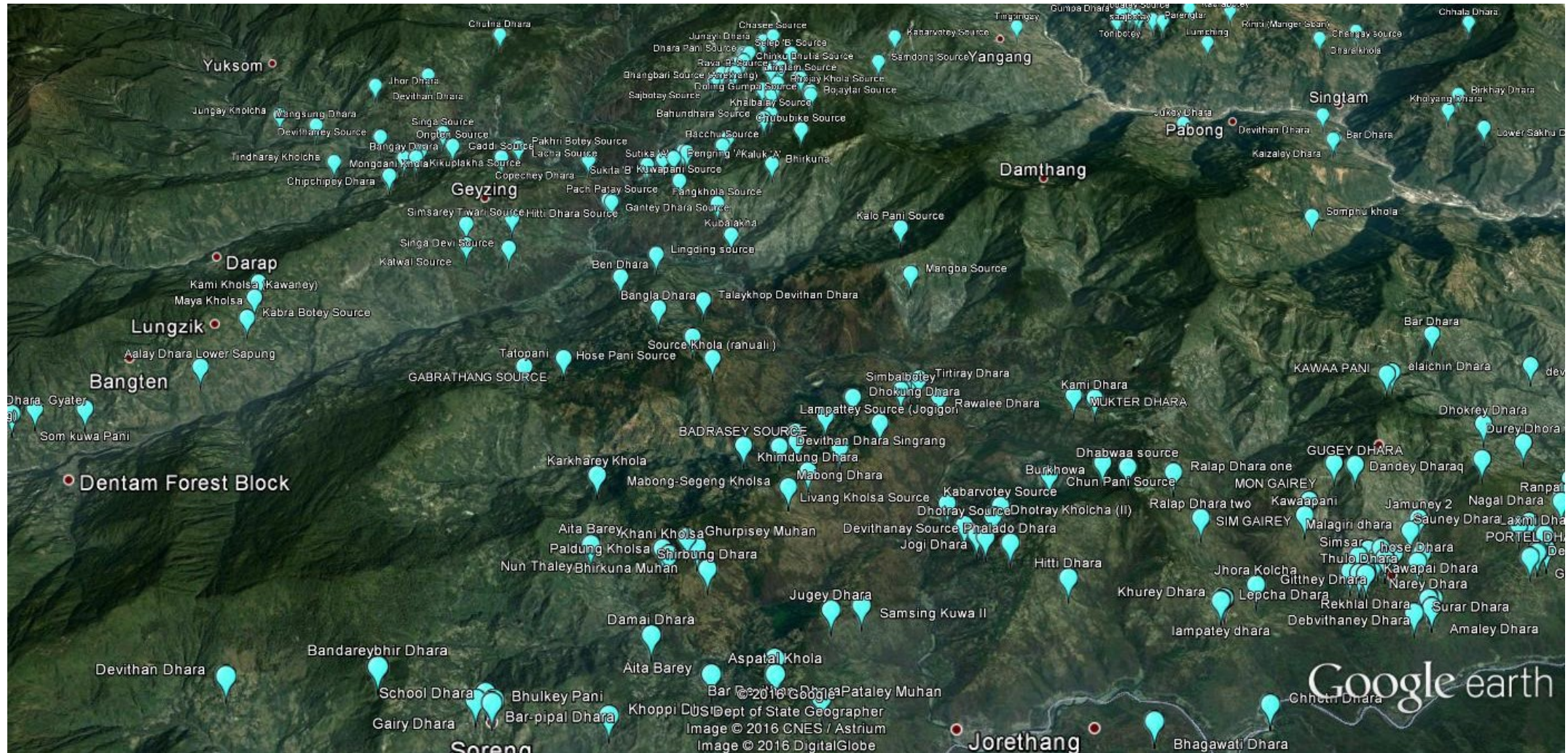


Drying up of the springs and its impact

The existing water supply system became defunct



Mapping of springs



Capacity building and training on Dhara Vikas- Para Hydrogeologist



**Water Source
Survey**



**Monitoring spring
discharge**



Interaction with the water users



Geological Assessment



**Survey of recharge area by technical team,
Panchayats and water users**



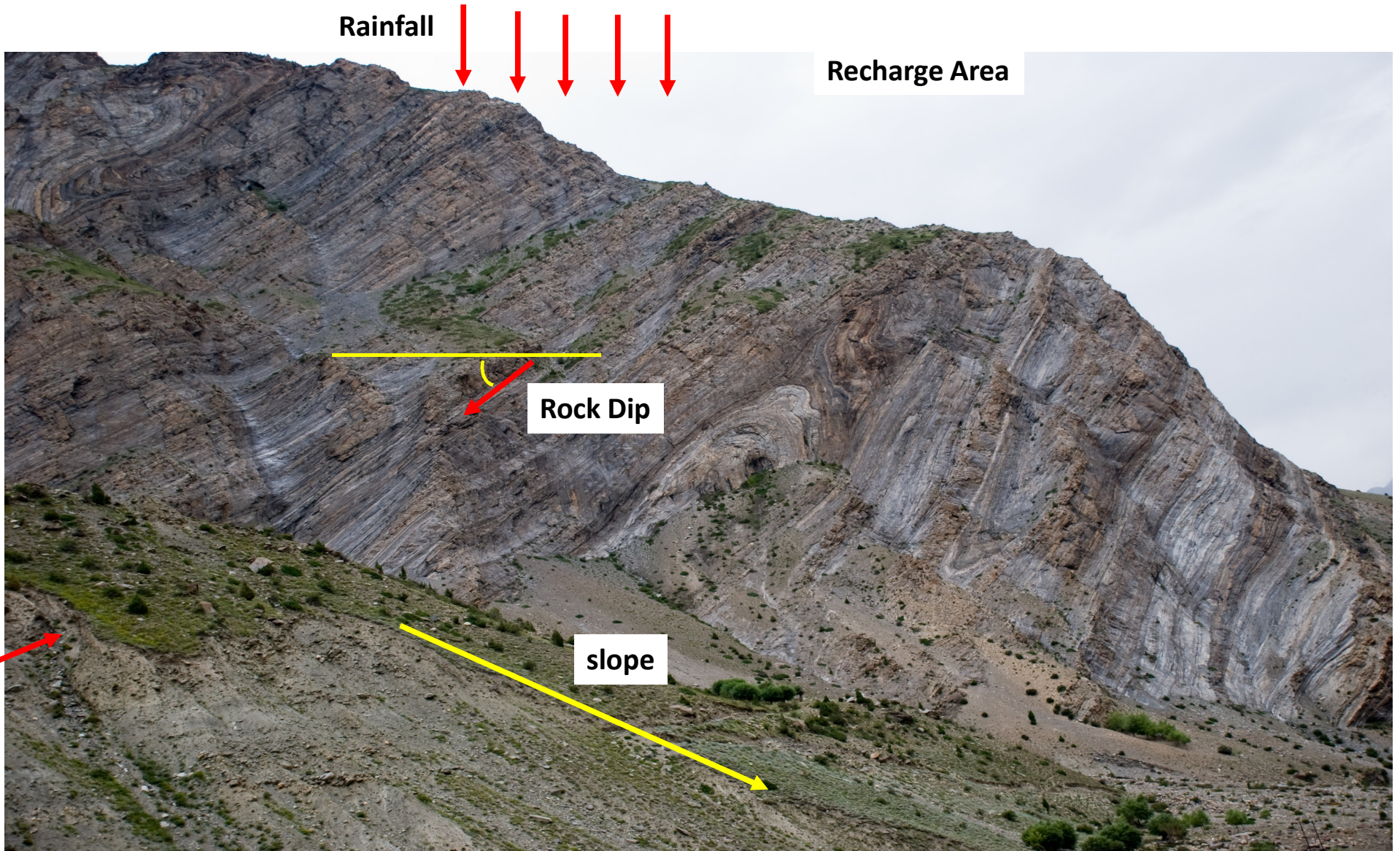
Rainfall

Recharge Area

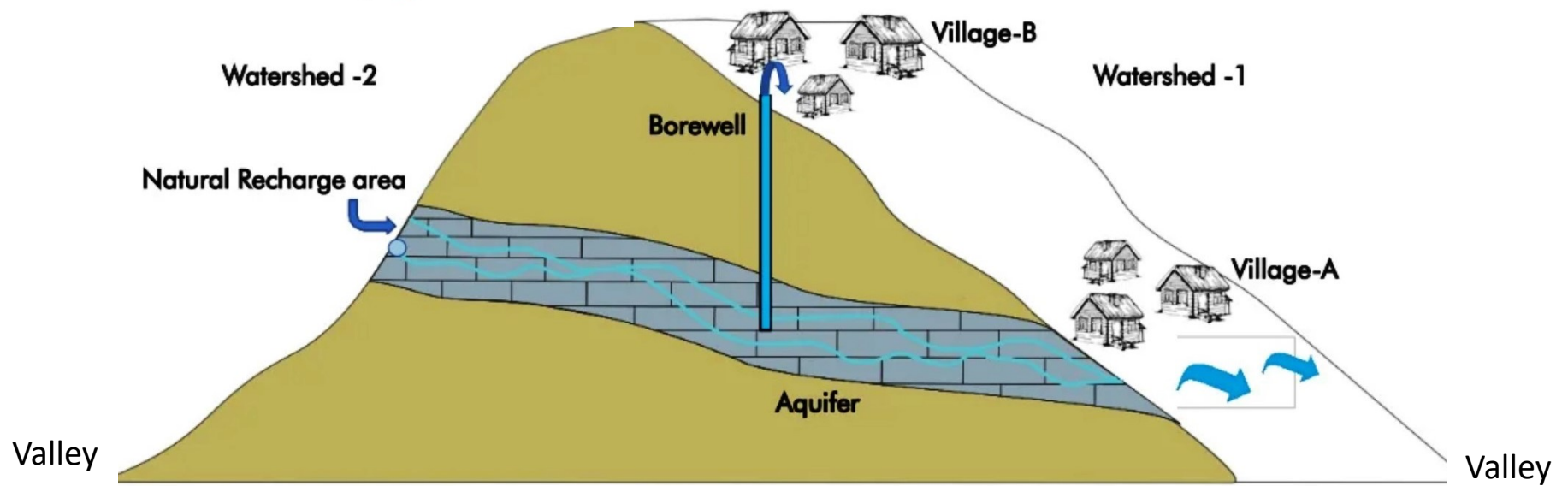
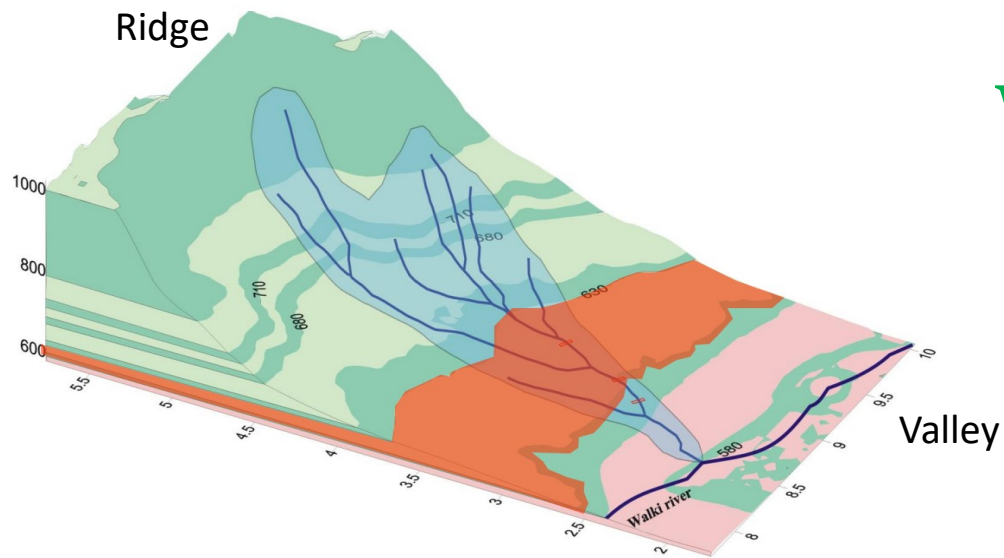
Rock Dip

slope

Spring



Watershed Vs Spring-shed



Focus on the source (springs) before 2011

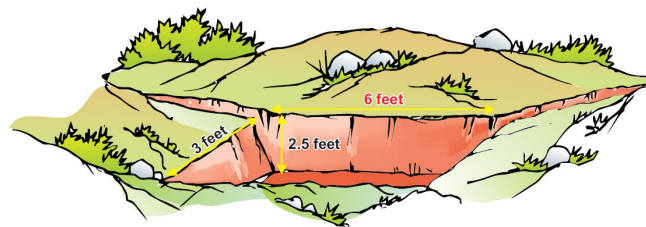
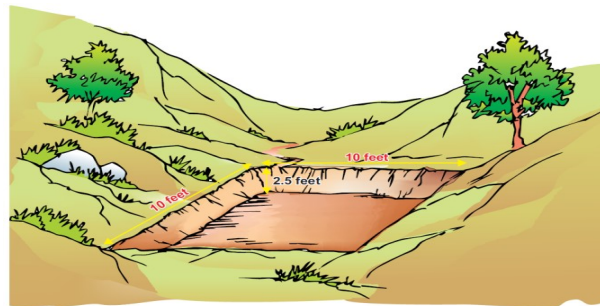
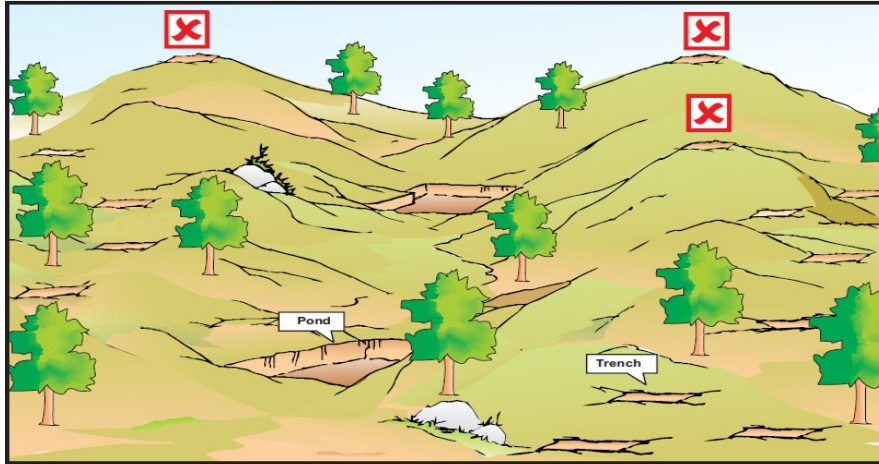


Focus on the resource (aquifer) after 2011 Tendong hill in South Sikkim



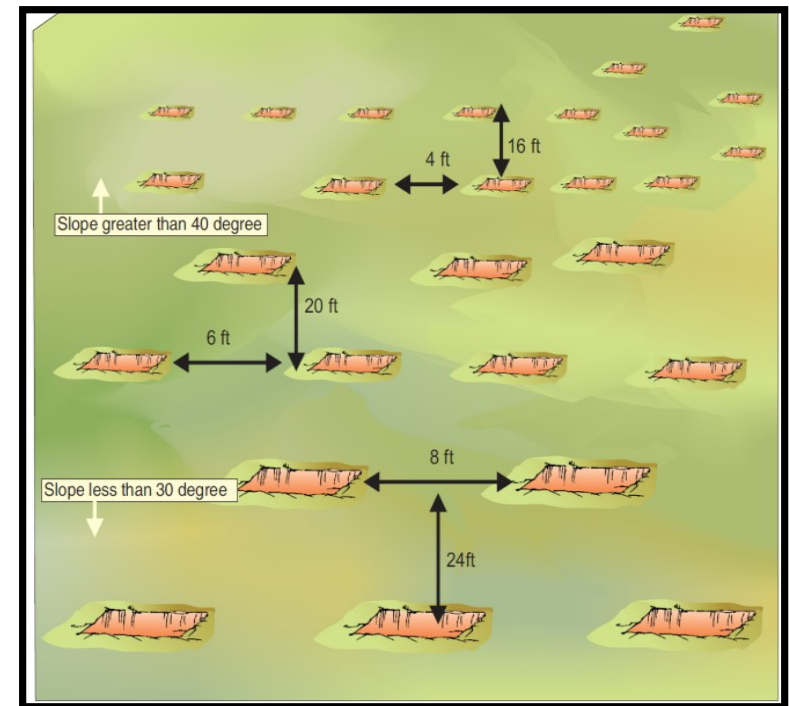
120 hec out of 1000 hec taken up for recharge intervention in 2013-14

Recharge structures



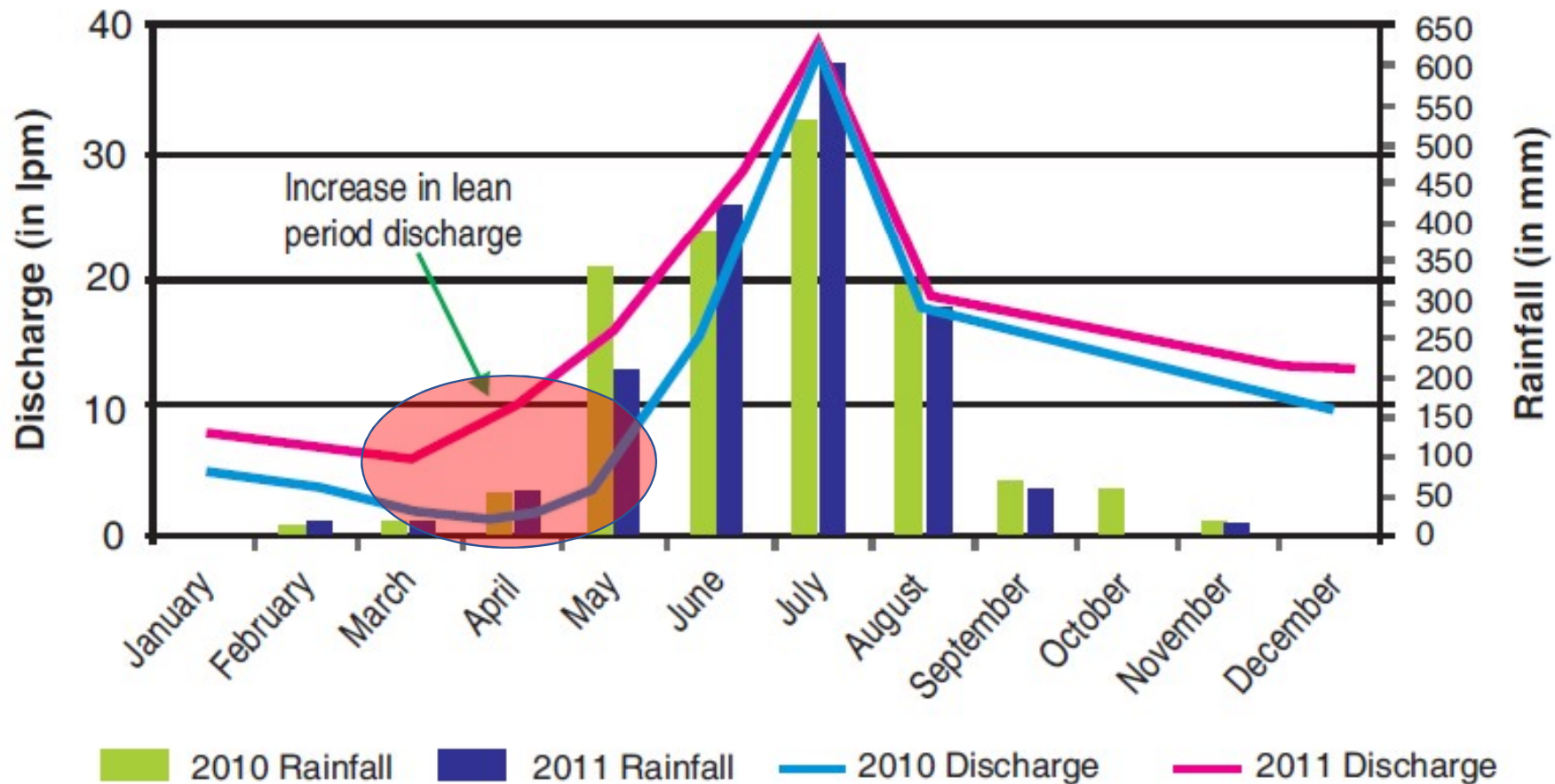
Design of the trenches on sloping lands

Slope	Size of the trench			Volume of trench	Total trenches per ha	Storage of water per ha*
	Length	Width	Depth			
%	m	m	m	cum	nos.	cum
<30	2.00	1.00	0.60	0.90	150	135
30-40	2.00	0.60	0.60	0.55	180	100
40-50	2.00	0.60	0.45	0.40	200	80



Effectiveness- Hydrograph of a spring

Hydrograph of a spring, showing the impact of artificial recharge on spring discharge along with rainfall pattern.



Resum RF, Rinchenpong, Kaluk Block, West Sikkim



Resum RF, 50 hectare, Rinchenpong, Kaluk Block

Mungram, Gupti, Sumbuk Block South Sikkim

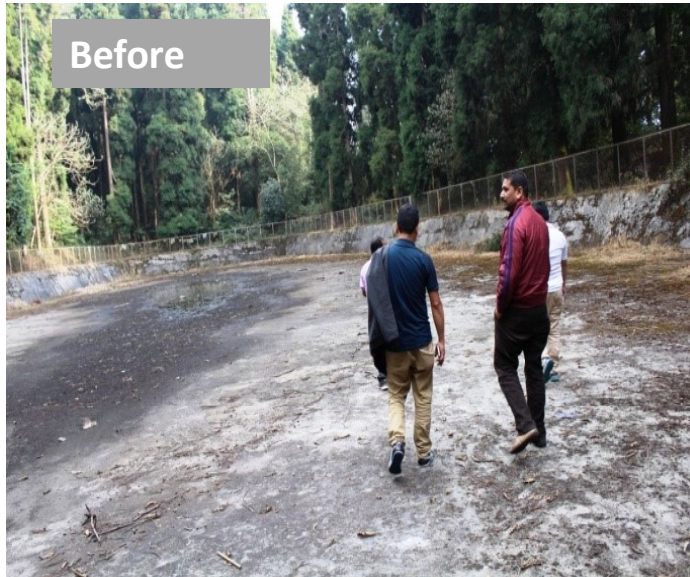


Mungram, Gupti, 60 hectare, Sumbuk Block

De-silting of recharge pond before monsoon by water users of Mellidara Voluntarily



De-concretization of Hilltop 'Tamley Pokari' (Lake) 2018-19



Now the lake functions as a recharge area for 12 springs downstream benefitting 50 households

Revival of Dolling Lake, Ravangla, South Sikkim

89 households have benefited from the springs which were recharged in the surrounding areas



Before (2008)



After (2011)



Present (2021)

Revival of Do-Thum Lake, Pemayangtse, West Sikkim



Revival of Suke Phokari, West Sikkim



It has sustained the flow of many springs downstream during the lean season on which Rainbow trout farmers depended.



Learning from mistakes

- Digging trenches on terraced fields
- Location of the trenches and ponds
- Forestry and horticulture plantations alone
- Lack of baseline information
- Independent monitoring is essential
- Concretizing of hill-top lakes to store water
- Pine plantations in upper catchments of drought-prone areas
- Focusing on individual springs and their recharge areas

Concretizing a hill top lake

Tamle pokhri in South Sikkim

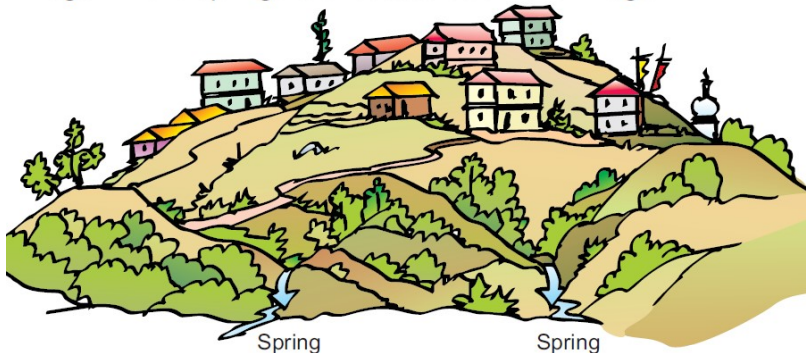


Old pine plantations in upper catchments

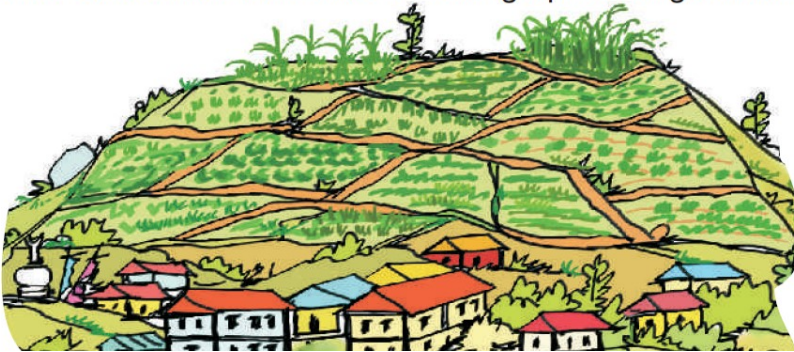


Places where the implementation is not Possible

Village is located on the top of the hill with no forests above the village. All the springs are located below the village



The land above the village is used for agriculture and no fallow land or forests are available for taking up recharge activities

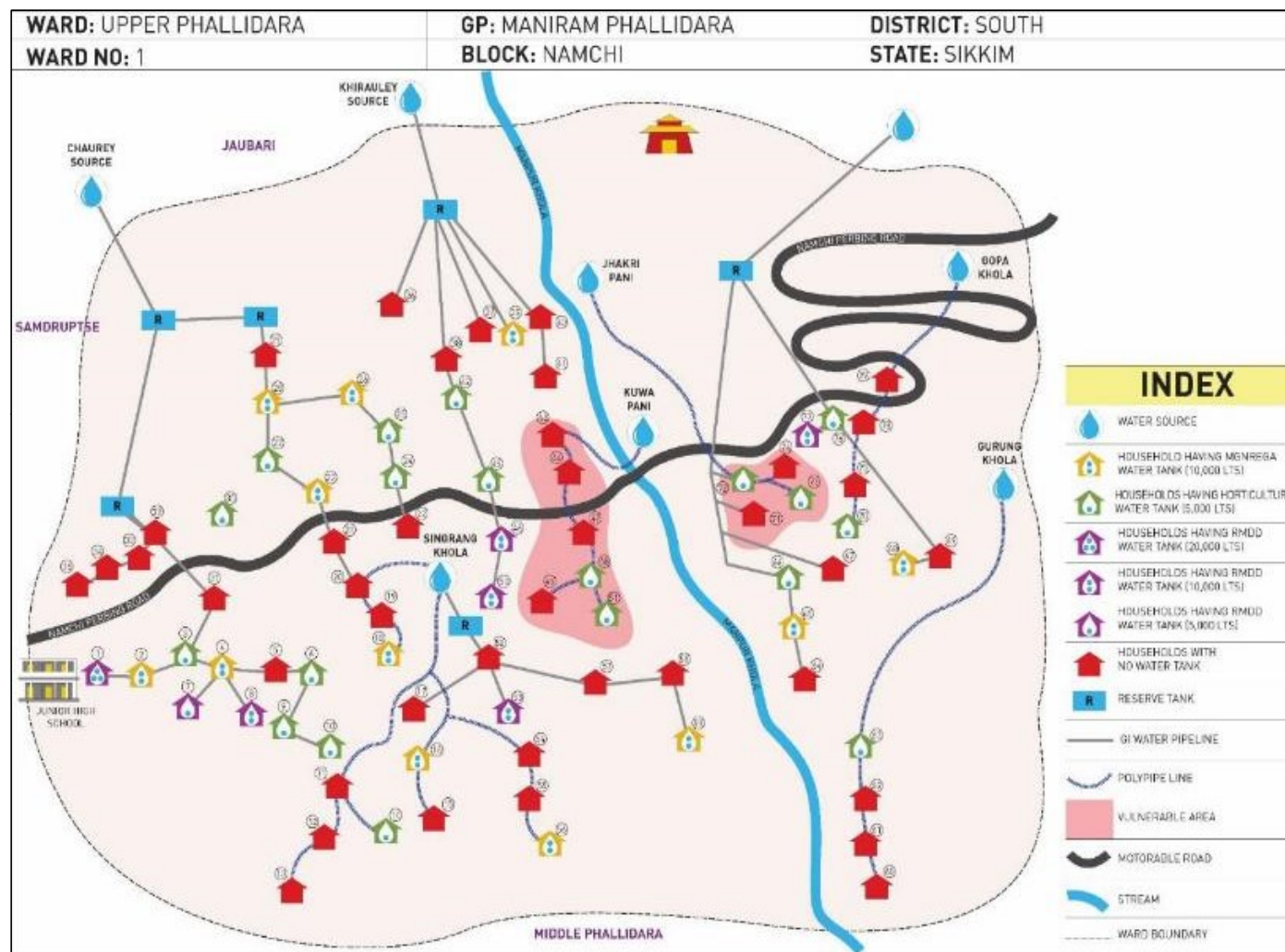


High rainfall area with landslide prone zones

Village Water Security Planning(VWSP)

Identification of vulnerable households/habitations

Ward/Village level Maps has been prepared for 72 Gram Panchayats in 14 Drought prone blocks of South and West District



VWSP- Assessment of Water Access/Supply at Household Level

GP Ward	No of HHs having				Total HHs
	Govt. G.I. Pipeline	Private Polypipe	Both Private & Govt. Pipeline	No direct Supply (fetch)	
Upper Chuba	26	10	0	8	44
Middle Chuba	29	9	9	1	48
Lower Chuba	52	5	8	3	68
Upper Phong	28	0	20	0	48
Middle Phong	17	32	4	0	53
Lower Phong	11	14	17	6	48



Output/Outcomes

729 Hectares of intervention, 4 hilltop lakes revived to the natural state, 3 lakes converted into recharge structures through Dhara Vikas Initiative. This has largely impacted the discharge of springs and streams downstream and augmented water supply for drinking, agriculture and other uses.

A total of 72,900 trenches and 4374 Ponds have not only help to recharge groundwater but also helped to control the downstream stormflow thereby, preventing Gully erosion and landslides. Acknowledged by some of the SDMs.

As per our estimate from each hectare of Dhara Vikas work we expect recharge of 1.5 Million litres annually with the investment cost of Rs. 0.02 per litre.

Supported by independent assessment by IISC Bangalore. Incorporated Dhara Vikas in the list of permissible works under MGNREGA By PCI. Sikkim is declared as the resource state for the development of spring-shed by the Ministry of Rural Development, GoI. Above all, played a crucial role in making a spring-shed development as a national movement and key adaptation strategy for water security in the Himalayas.

Key Challenges

Conceptual issues

Technical know-how

Standardization of spring-shed development Strategy

Fund mobilization

Dissemination and acceptance of these new technologies

Generation of Database

Places where implementation is not possible

Monitoring and evaluation

Future plans

1. Setting up of critical zone observatory (CZR) for spring-shed.
2. Strengthening database of springs.
3. Designing software to generate reports on feasibility studies of the spring shed.
4. Strengthening capacity of the field Para-Hydrogeologist with advanced techniques and tools.
5. Understanding the aquifer system of the Sikkim Himalayas and if the possible mapping of the same
6. Incorporating the role of ET in spring-shed management
6. Monitoring water quality parameters

Capacity Building Training of field functionaries by ACWADAM- Para-Hydrogeologist



IEC - Training handbook & posters in English and local language on Dhara Vikas



Knowledge Sharing

Based on Sikkim's model Meghalaya is implementing project worth Rs. 250 million under NAFCC

Sikkim's springs initiative partners - working in Uttarakhand, Nagaland and Mizoram.

NABARD has extended its watershed management programme in north east India based of spring shed development approach.

Royal Government of Bhutan is replicating the works of Sikkim with the support from RM&DD, ICIMOD and ACWADAM



Workshop in Thimpu, Bhutan, Dec 2017

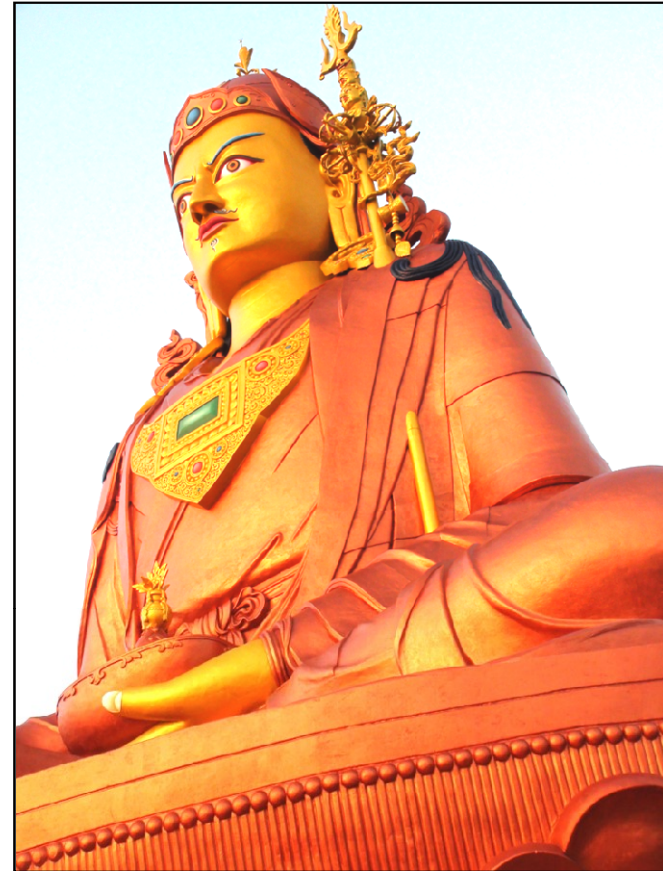


Workshop in Kathmandu, Aug 2015

**Presentation of Dhara Vikas Initiatives to
Hon'ble Union Minister, Shri. Nitin Gadkari,
Ministry of Water Resource at New Delhi on on
6th February, 2018**



Mt. Khangchendzonga (8,598 m)
The Guardian Deity of Sikkim
3rd Highest Peak in the World



Guru Padmasambhava
Patron Saint of Sikkim

Thank You