
WATER

Water crisis at Global level

- In the last 100 years, global population tripled, but freshwater use increased six fold.
- As the world moves from the International Year of Freshwater(2003) to the UN Decade of Freshwater(2005-2015), two billion people in over 40 nations face freshwater shortage.

- 2.5 per cent of Earth's water is freshwater. Less than one per cent (200,000 billion cubic meters) is usable.
- Each liter of wastewater pollutes at least eight liters of freshwater.
- Already, half the population of developing countries lives in water poverty. Per capita water consumption in industrialized countries(500-800 liters per day) is on an average 10 times more than that of the developing nations(60-150 liters per day)

- 1.085 to 2.187 million deaths worldwide in 2000 due to diarrhoeal diseases can be attributed to unhealthy water and sanitation. 90 per cent of these deaths occur in children under five.
- Worldwide, 57-69 per cent of industrial water use is for hydro/nuclear power generation, 30-40 per cent for industrial processes and 0.5-3 per cent for thermal power generation.
- People having low incomes end up paying 2-50 times more for a liter of water than higher income groups who are often connected to heavily subsidized water infrastructure.

- Mismatch between global distribution of freshwater and population leads to more scarcity of freshwater. In Latin America and the Caribbean, about 40 per cent of the population is concentrated in 25 per cent of the region's territory having 10 per cent of the area's freshwater resources.
- It remains to be seen if the UN Millennium Declaration goal of halving the proportion of people without sustainable access to safe drinking water by 2015 would be achieved.

- Not a drop spared
- Use of water exceeds nature's capacity to recharge water resources

- Climate change will account for an estimated 20% of this increase in global water scarcity.
- By the middle of the century, at worst seven billion people in 60 countries will be faced with water scarcity.
- Humid areas will probably see more rain, while it is expected to decrease and become more erratic in many drought-prone regions and even some tropical and sub-tropical regions.
- Water quality will worsen with rising pollution levels and water temperatures.

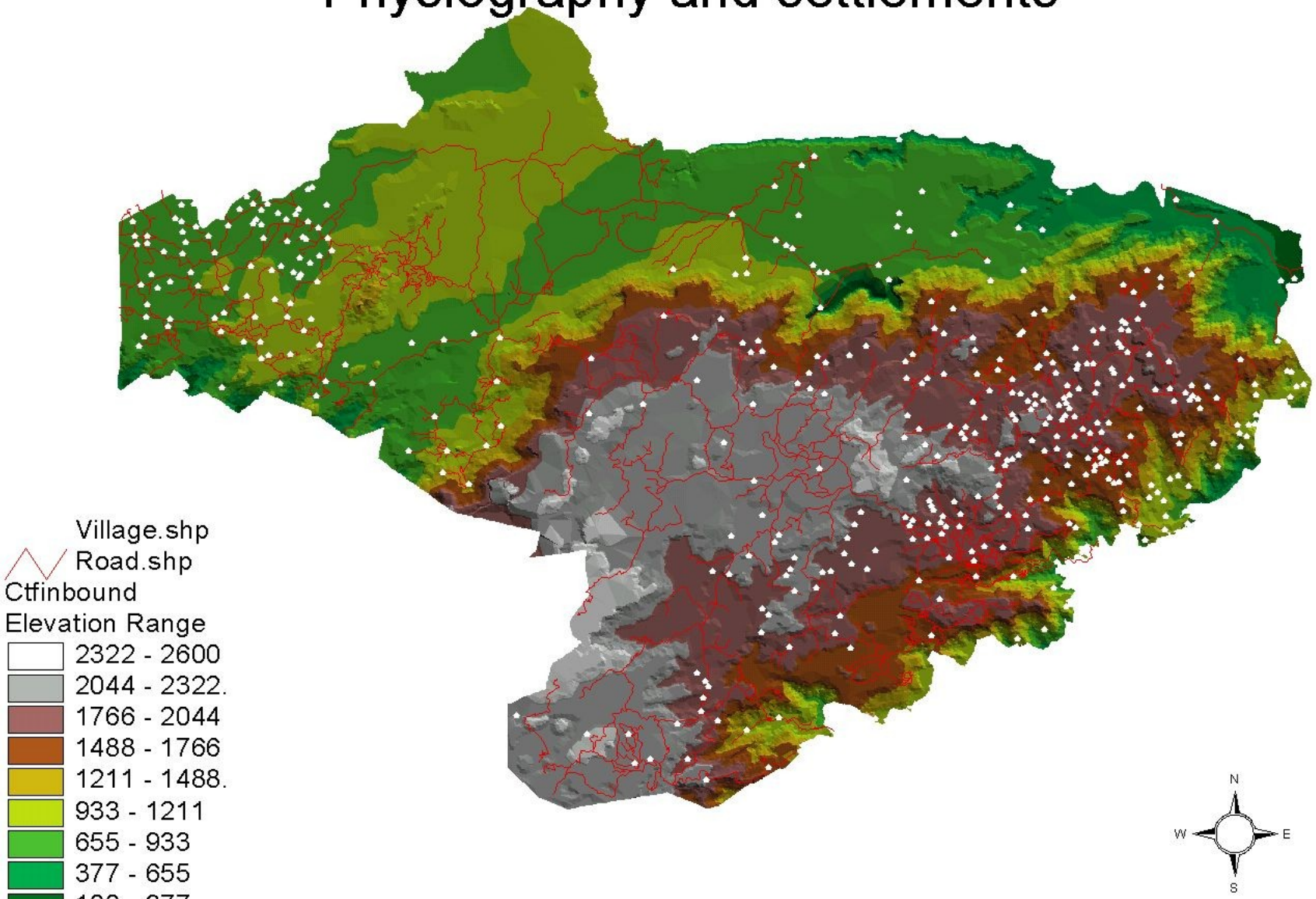
- About 2 million tons of waste are dumped every day into rivers, lakes and streams.
- If pollution keeps pace with population growth, the world will effectively lose 18,000 cubic kilometers of freshwater by 2050.
- Asian rivers are the most polluted in the world, with three times as many bacteria from human waste as the global average. These rivers have 20 times more lead than those of industrialized countries.
- Irrigation currently accounts for 70% of all water withdrawals worldwide.

- Everyday, 6000 people, mostly children under the age of five, die from diarrhoel diseases.
- More than 2.2 million people die each year from diseases related to contaminated drinking water and poor sanitation, about a million die from malaria each year and more than 200 million suffer from different diseases.

SURVEY INFORMATION ON NILGIRIS

- Covered the entire district – all 4 river basins : Bhavani, Chaliyar, Kabini & Moyar
- Sampled 55 villages covering 71,566 persons from 13 distinct communities
- Identified 120 water sources
- Observed 291 water extraction structures
- Large Dams & Reservoirs are mainly for Electricity Generation to the State
- 4 river basins contribute to water in 3 states

Physiography and settlements



Terrain and hydrology

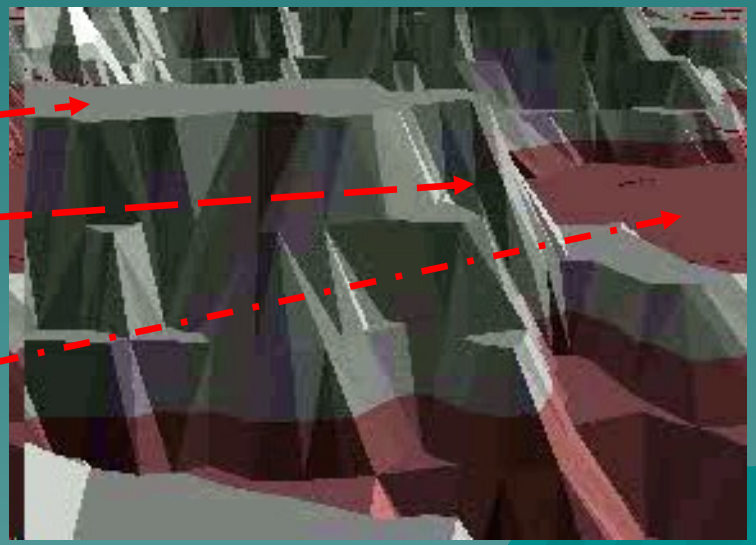
- About 6 months of dry period with dry spells even during other six months
- Mostly seasonal streams-Dry up soon after rains
- Steep terrain- High run off- Low recharge
- Mountainous terrain-Leaky aquifers
- Three main hydrological systems
  * Plateau * Plateau edge * Foothills

Edge of the Plateau

- Shallow soils
- High run off
- Hard rocks
- Summer Scarcity

Plateau Region

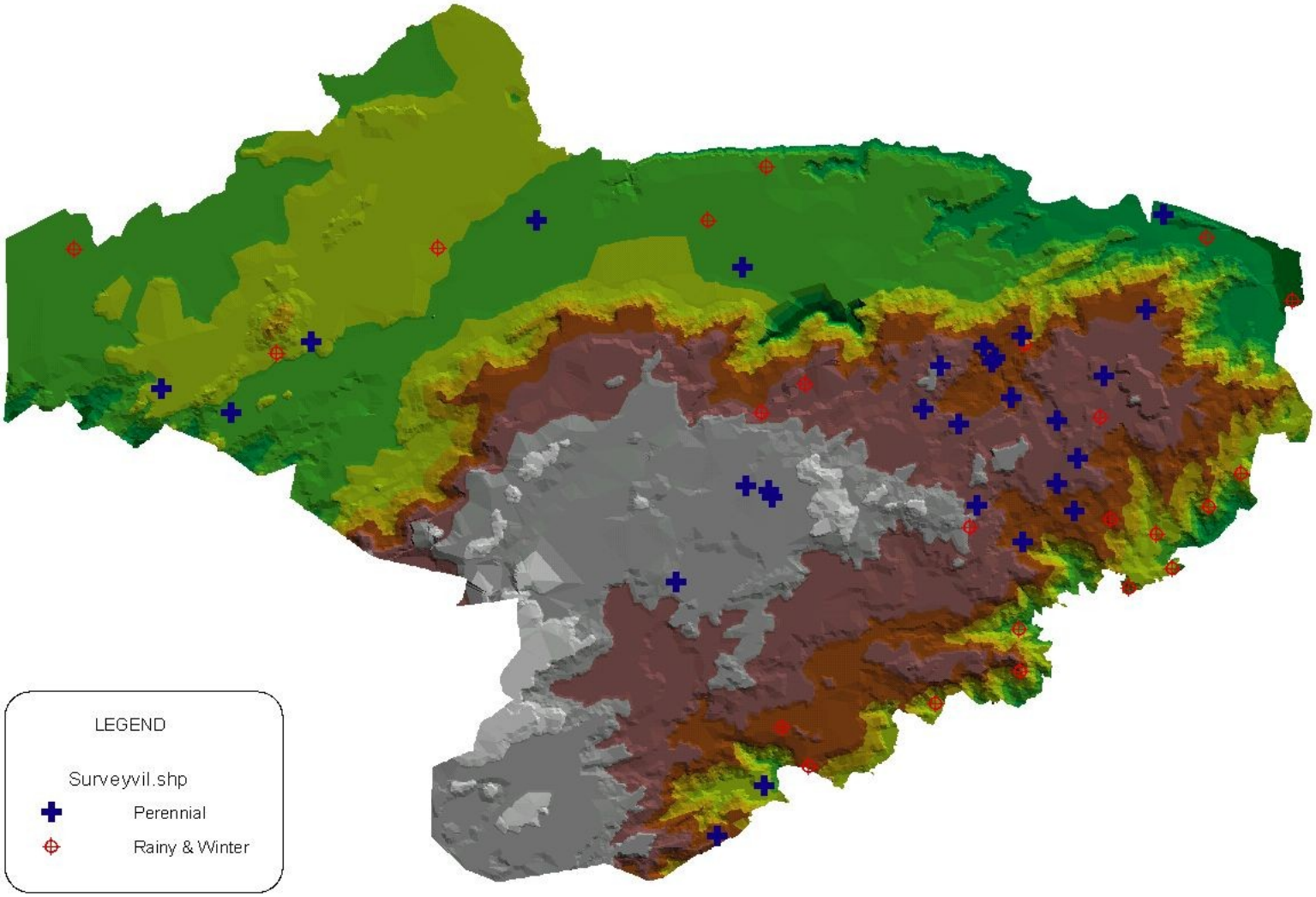
- Lateritic aquifers
- Springs
- Deep soil & intensive farming
- High irrigation demand



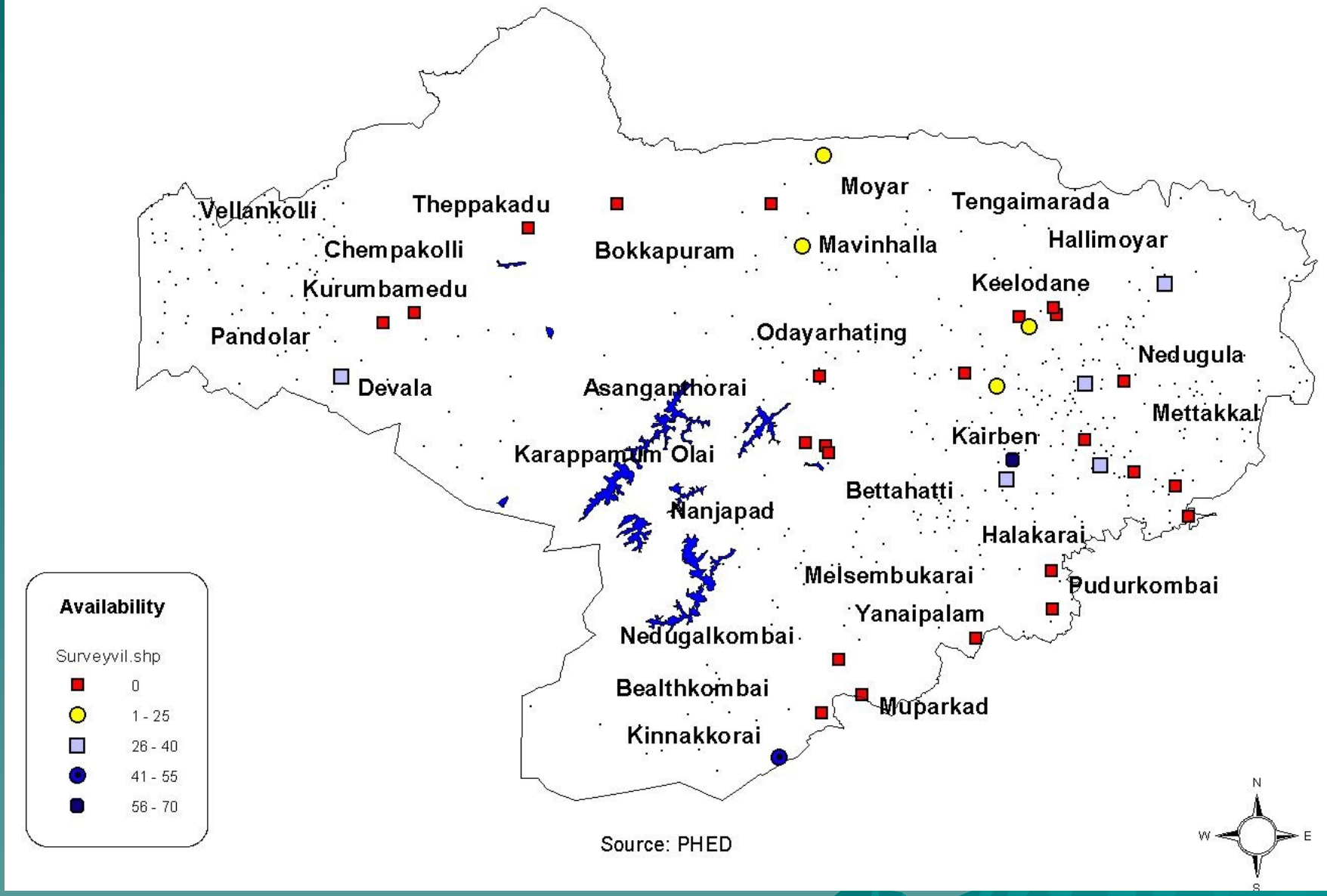
Hydrogeology

- Lateritic caps with springs in Plateau -Hard rocks with few springs in edge of plateau
- North-East trending faults controlling drainage and probably middle altitude springs
- Outer slopes with shallow soil cover and very few springs- high water scarcity
- Pockets of deep soil/alluvium along valleys- good aquifers- suitable for wells.
- Shola-Spring interlinkage

Seasonality of the main source among the sample villages



Water availability in sample villages (LPCD)



Source: PHED

Types of Nilgiris Water Resources

Natural Sources

- River
- Shola
- Spring
- Stream
- Swamp
- Water hole

Man Made structures

- Check dam
- Wells
- Tank
- Dam
- Canal

Issues - Water Resources

- Upstream catchment location of Nilgiris
- Multiple sources but variety of features being used
- Springs emerge as critical water bodies : do we know enough about them?
- Conservation measures for other water sources?
- What other policy & operational incentives are needed for sustainable management of water resources in the Nilgiris?

Water Distribution & Management

- Commercial exploitation of water resources reduces availability for domestic users?
- Equity issues with regard to limited water sources to serve different locations?
- Villages dependent on traditional water systems (mainly springs, streams & wells) are stable while those dependent on conventional systems show stress?
- Local bodies do not have capacity to manage conventional systems?

Communities & Water Management Systems

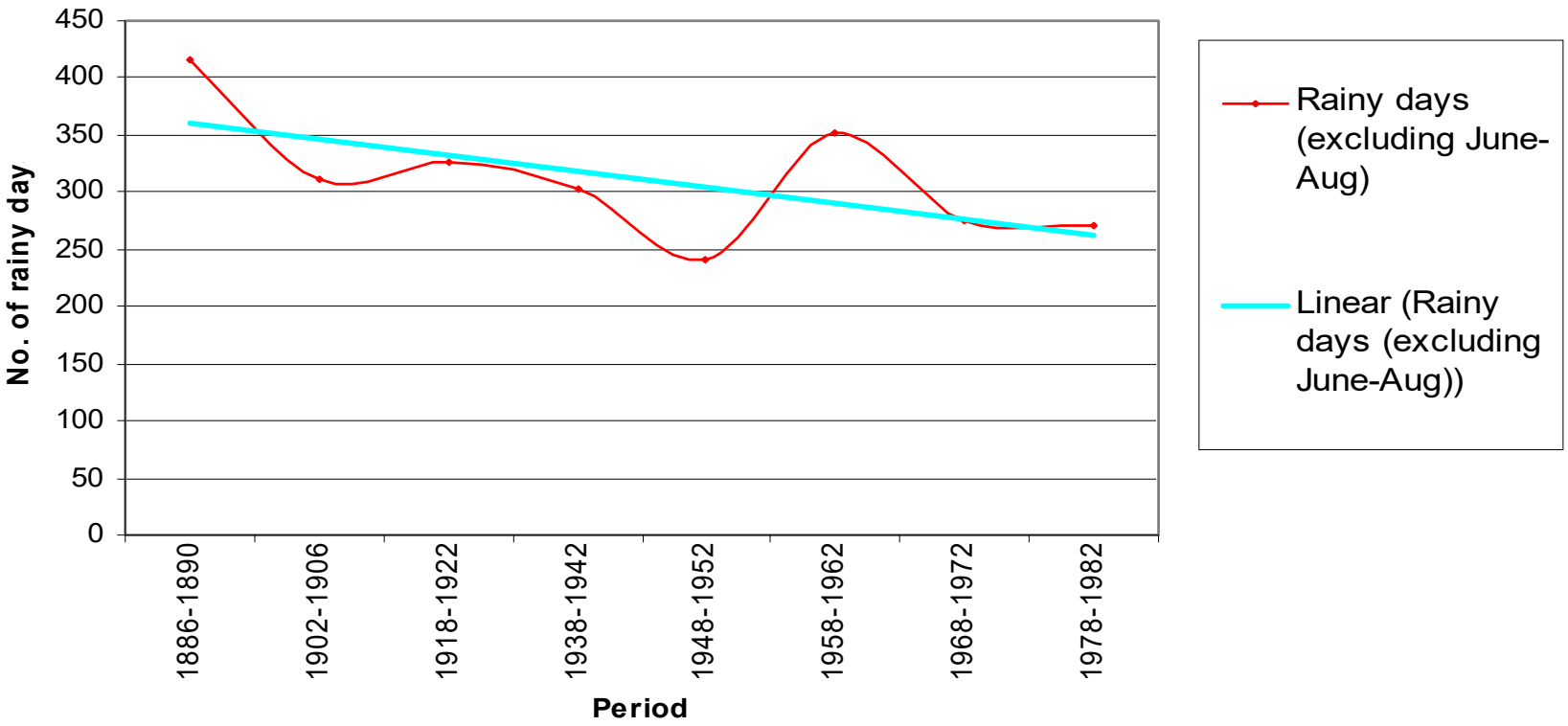
- Traditional management by communities replaced with conventional pipe systems?
- Traditional rights and practices exist in patches – does this ensure better management?
- With high demand – supply gap, what innovations & arrangements are needed?
- How do we plan & regulate water resource usage and resolve conflicts, e.g upstream – downstream interests?
- Division of roles & responsibilities between state institutions & community institutions?

Sustainability Issues

- Pollution issues e.g : impacts of agri-chemical inputs, biological contamination
- Do we need specialized management & regulatory institutions for Nilgiris Waters?
- How do we systematically overcome the recurrent crisis of drinking water shortages?
- Appropriateness of supplementary measures in Nilgiris, e.g rainwater harvesting?

Major Issues

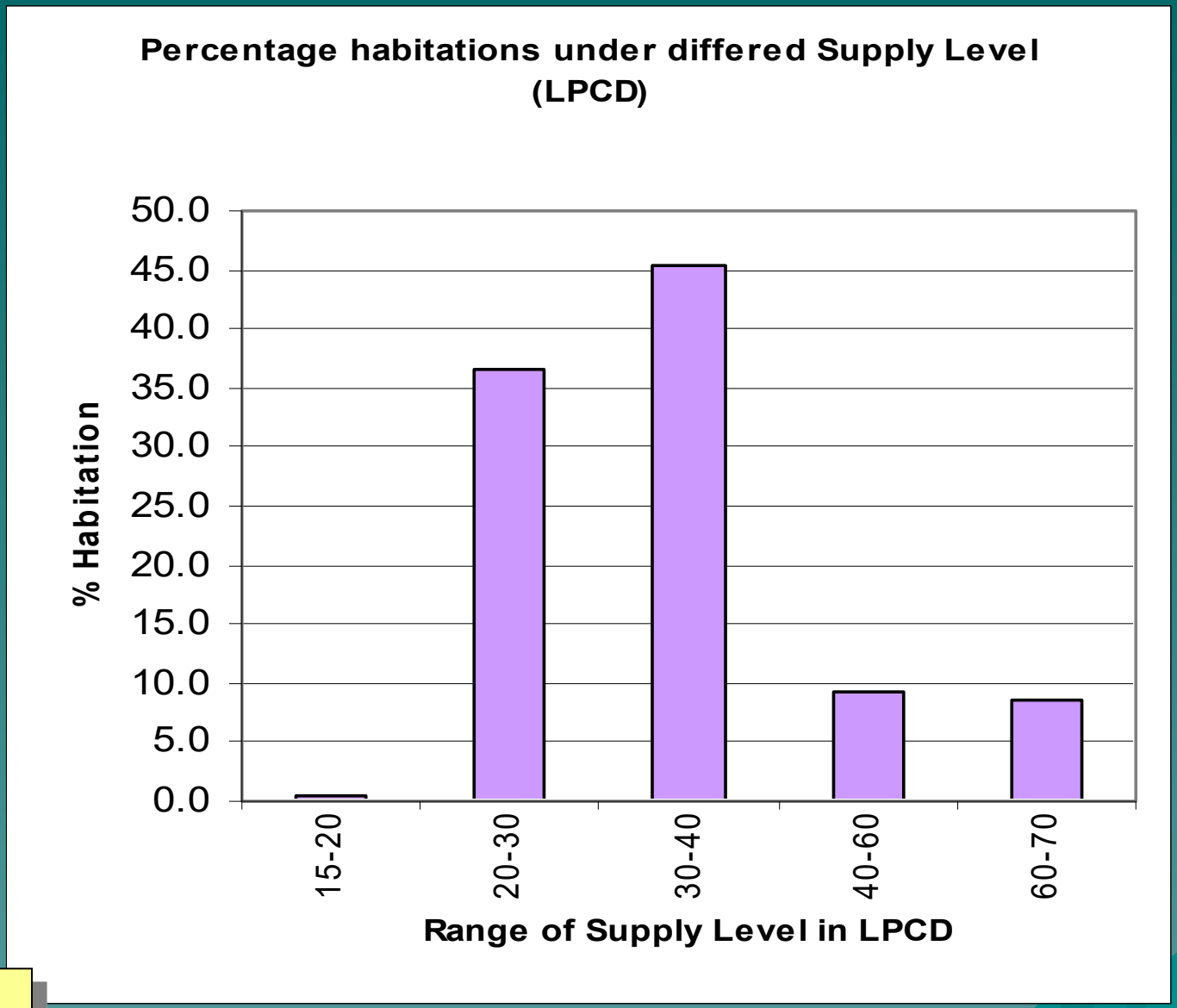
- Dwindling Domestic Water Sources
- Community Water Management Systems are weak
- Areas of tea cultivation also have springs where chemical inputs are in large quantity
- Reducing Sholas remain crucial in water retention and spring habitat



Data Source: Meher-Homji V.M, 1991, Probable Impact of Deforestation on Hydrological Process, Climate Change 19:163-73, Institut Francais, Pondicherry

Water Delivery Systems

- Spring with Gravity pipeline
- Open well with pump
- Spring with pump & tanks
- Bore well with pump
- Open well without pump



Data Source:

TWAD, Ooty, Dec. 2001

Water Activities

- Out of 120 sources – 74 are for drinking water purpose – the maximum emerging from springs (30nos)
- Streams account for 27 % amongst the type of water sources and have multiple roles –
  - Drinking – 8%
  - Washing – 9 %
  - Bathing & Washing – 1 %
  - Irrigation – 8 %

Water Management during Summer

For areas less than 200 persons

- 36 % face no shortages
- 7 % reduce their demands of water through mutual arrangements
- 8 % depend on adjacent villages
- 14 % depend report to Panchayat for alternate source
- 7 % depend on shola source
- 21 % on springs
- 7 % on water holes

Analysis from Secondary Sources

Water Supply & Availability

- Domestic Water Supply
- Domestic Uses
- Shortages & Arrangements in Summer
- Water Issues faced by Communities

Water Sharing

- 75 % say `No' to water sharing
- Check dam is the only structure to enable fair sharing
- Unequal situation arises from the location of a spring
- Springs account for 30 % of the water sources reported

Resource Issues

- Springs and small aquifers are main sources during summers
- Settlement concentrated on mid-altitudes with few springs
- Plateau Lateritic springs over exploited-tanker supply becoming common
- Sustaining plateau edge population already facing water scarcity
- Spring rejuvenation would necessitate community/village level action

Peoples Preference

- Springs are first preferred for drinking then wells and streams
- Most dependable for washing is the stream
- Number of villages using springs & streams is higher than the villages using wells

The Future

- Sustainability of Nilgiris Waters
- Upstream & Downstream – water activities which are harmful to people & ecosystem
- Conservation & Development of Local Water Resources
- Decision making & Institutional arrangements for managing hill water

The Blue Waters Conclusions I

- Water Conservation & Management Strategies
  - Importance to conserve a water source location
  - Springs are the most critical water bodies in the Nilgiris : need to understand their ecology better
  - Existing Swamps need urgent protection
  - Only conservation of shola patches will not ensure water availability
  - Rain Water Harvesting needs to be encouraged

The Blue Waters Conclusions II

- Water Distribution & Management
  - Over-dependence on Water supply & Maintenance : has affected traditional management systems
  - Maximum systems are tapping springs for onward supply
  - Water users group to address issues of portability, maintenance, sharing – does not exist

The Blue Waters Conclusions III

- Community Based Water Management Systems
  - Existing approach of communities – not collective
  - Traditional rights and practices exist in patches
  - Need for revival of common water management systems
  - Less water available – need to find innovative mechanisms & new arrangements