



Application of Quantum GIS to facilitate NRM Planning & Management

MGNREGA – EB Project



Origin & Scope



MGNREGA passed in Parliament on Sept. 9, 2005

- | | |
|---|----------------------------|
| 1. District Covered : | 685 |
| 2. Blocks covered : | 6,863 |
| 3. Village councils (Gram Panchayats) : | 262,840 |
| 4. Total Job cards issued : | 124.9 mn HH
250 workers |
| 5. Total Active workers : | 100.1 Million |

Preamble of the Act

For the enhancement of livelihood security of rural households by providing at least one hundred days of guaranteed wage employment in every financial year to every household whose adult members volunteer to do unskilled manual work



Significance of NRM for Rural India

1. India has large rural population (68.84%)
2. Primarily engaged and dependent on agriculture
3. With massive population and over stressed productive land, dependent on erratic rainfall for irrigation
4. Only **45%** of the net sown area is under irrigation out of total **141** million hectares area
5. Regional imbalances in the facilities of irrigation and lack of last mile command area network and other suitable interventions are creating problems in agriculture in rural areas



NRM focus of MGNREGA

Create assets that will help in agriculture, thereby creating expanding livelihood for rural households and future self sustainability

- Total **155** kinds of works permitted under MGNREGS
- Out of these, **100** works (**64%**) relate to **NRM**
- Of these NRM works, **71** works are **water** related
- Water conservation for water **management** and **drought** mitigation:
farm ponds, check dams, structures for ground water recharge, farm ponds, underground dykes, percolation tanks, artificial recharge of wells through sand filters etc.

Outcome of NRM activities



1. Increasing NRM focussed expenditure:

1. FY 2014-15: 2.58 billion USD (**49%**),
2. FY 2015-16: 4.46 billion USD (**59%**)
3. FY 2016-17 : 4.96 billion USD (**61%**)

2. In Financial Year 16-17:

- Total of **3.15 million** works were completed
- **35%** (i.e. **1.09 million**) works were **irrigation related**
- Of these, **0.57 million** were farm ponds



MGNREGA Planning process using QGIS

- To synergize sectoral approach with spatial approach, innovative approaches and tools are required.
- Spatial Databases in GIS environment have potential to assist in planning, implementation and monitoring of various NR programmes.
- An effort was made to demonstrate the integration of local level spatial and non-spatial data into a useful format, with thematic outputs used for facilitating participatory planning at GP and village level
- QGIS tool provided Decision Support System for perspective and executive level planning at local level.



- QGIS is the leading open source GIS software package and one can download it by visiting <http://hub.qgis.org/projects/quantum-gis/wiki/Download> to.
- QGIS is released under the GNU General Public License (GPL). Totally free as compared to ArcGIS is 25-50,000 USD
- QGIS is much easier to use than other leading commercial desktop GIS packages
- The intuitive QGIS interface includes features designed to make it easier for the GIS beginner to either complete basic analysis or punch out a few maps.
- QGIS is continually updated with new and improved workflows and an extensive range of built-in geo-processing tools.
- There is also a plugin repository allowing users to download many additional tools individually if needed which is steadily increasing – even these are free



View data

- You can view and overlay vector and raster data in different formats and projections without conversion to an internal or common format.
- Spatially-enabled tables and views using PostGIS, SpatiaLite and MS SQL Spatial, Oracle Spatial, vector formats supported by the installed OGR library, including ESRI shapefiles, MapInfo, SDTS, GML and many more.

Explore data and compose maps

- You can compose maps and interactively explore spatial data with a friendly GUI. The many helpful tools available in the GUI include:
 - QGIS browser
 - On-the-fly re-projection
 - Data Base Manager
 - Map composer
 - Overview panel
 - Identify/select features
 - Data-defined feature labelling

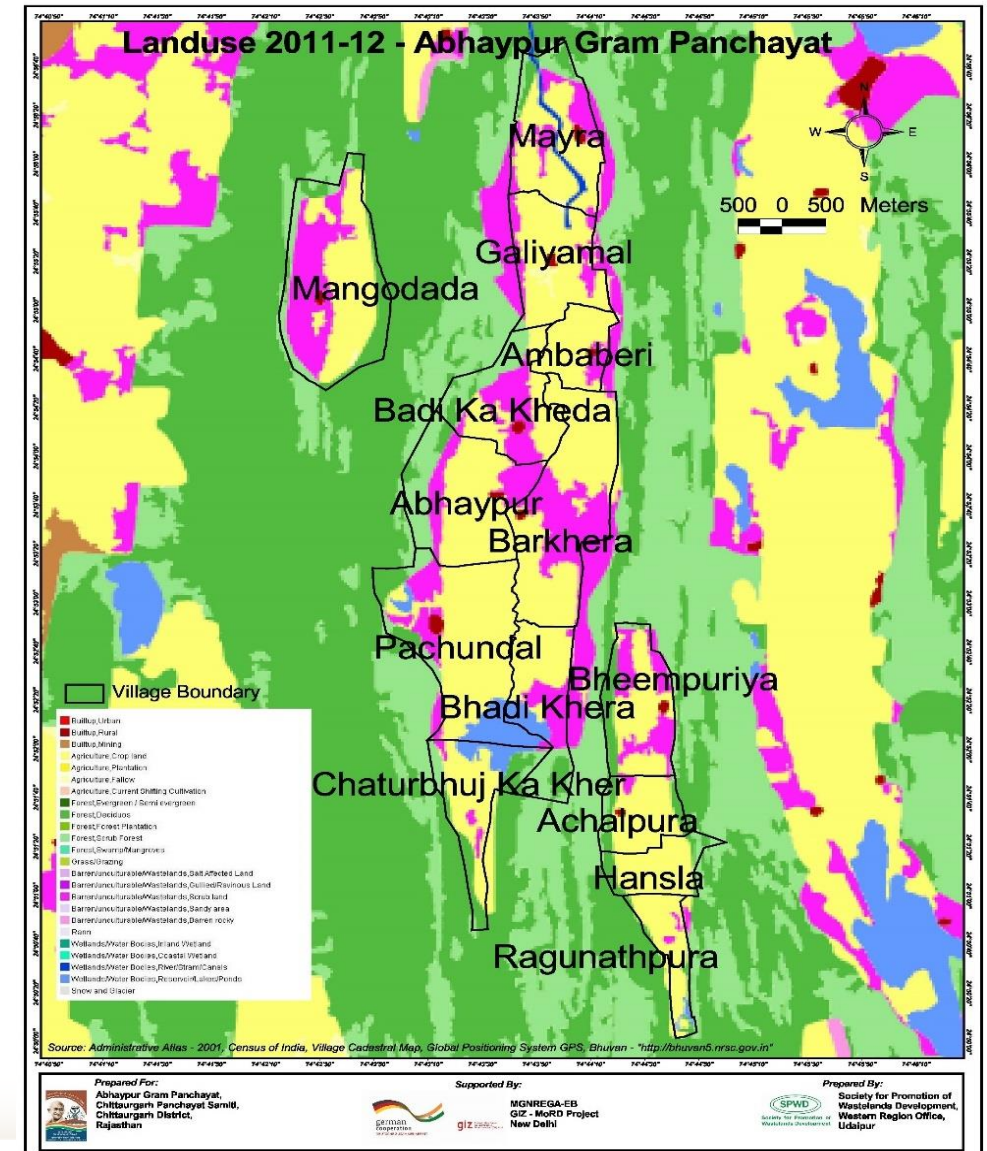


1. Land use / Land cover Map :

-The Land Use/Land Cover (LULC) maps were developed by NRSC for whole country and are available on 1:2, 50,000, 1: 50,000 and 1:10,000 scale.

- Through Q-GIS accessed the LULC maps from Web Map Services and processed to generate LULC map of GP for different time periods to understand the changes taking place.

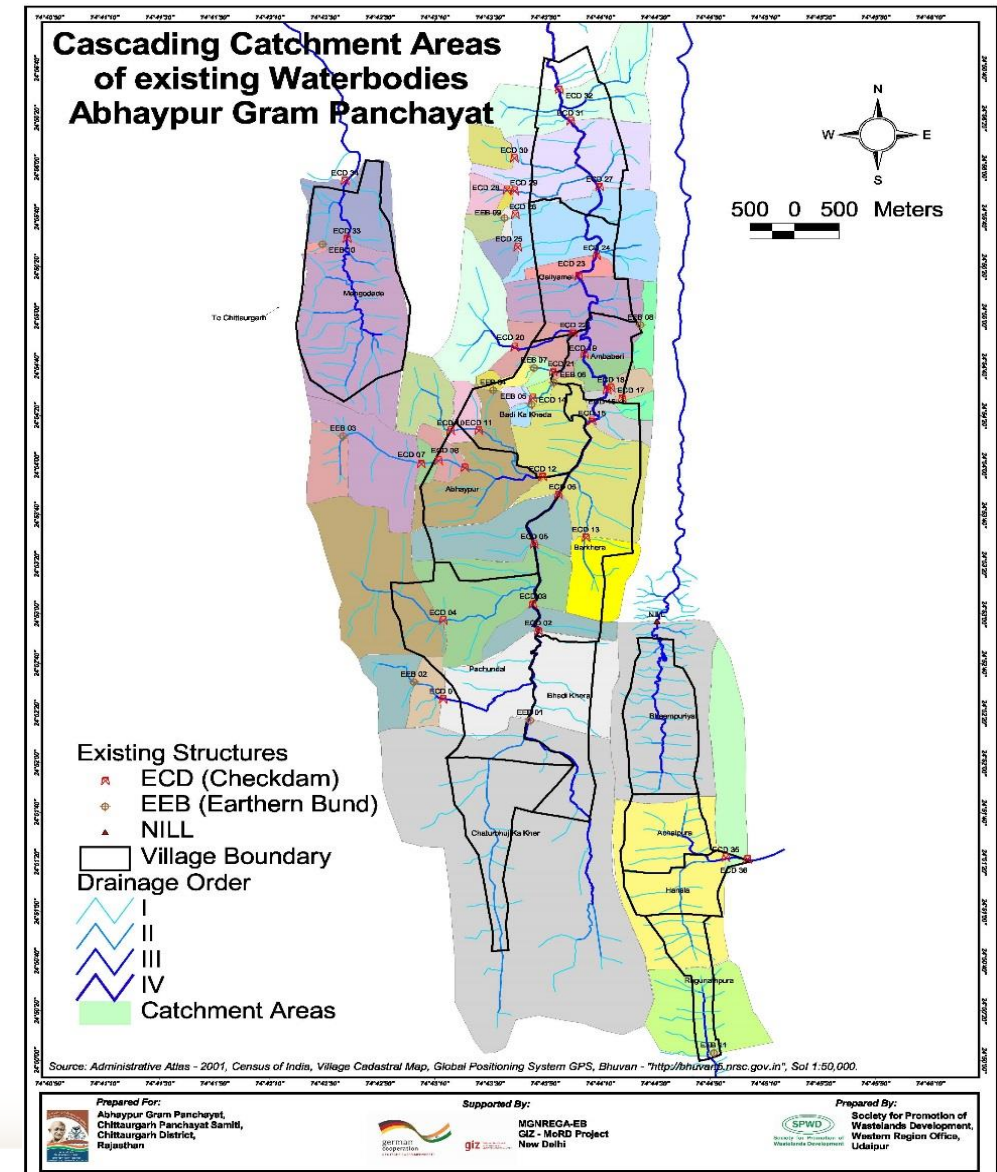
-The information of the existing land use and land cover helps the decision maker in choosing the type, mode and site of activities





2. Micro-watersheds and GP Map:

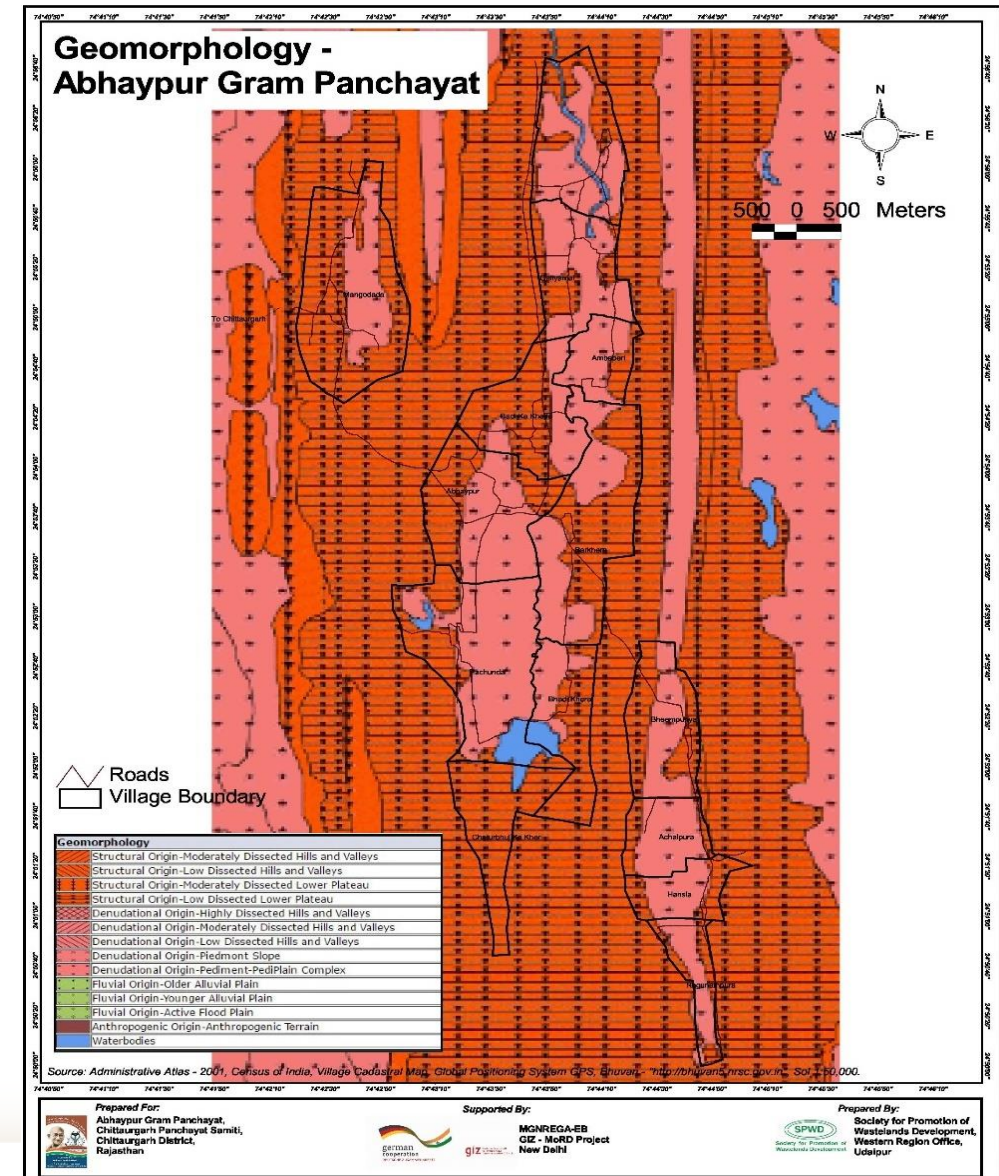
- Q-GIS was used for preparing micro and macro watershed boundaries. The related shape files were accessed from Web Map Service (WMS) and processed in Q-GIS for generating the thematic map of particular area.





3. Geomorphology Map:

- The particular layer is available from Web Map Service and it provides important details for determining the interventions in a particular location
- Q-GIS offers options to process these layers and generate map of Area of Interest (AOI)
- This kind of information, together with rock types and structures, permits proper selection of sites for dams and roads as well as estimation of peak flows and timing.



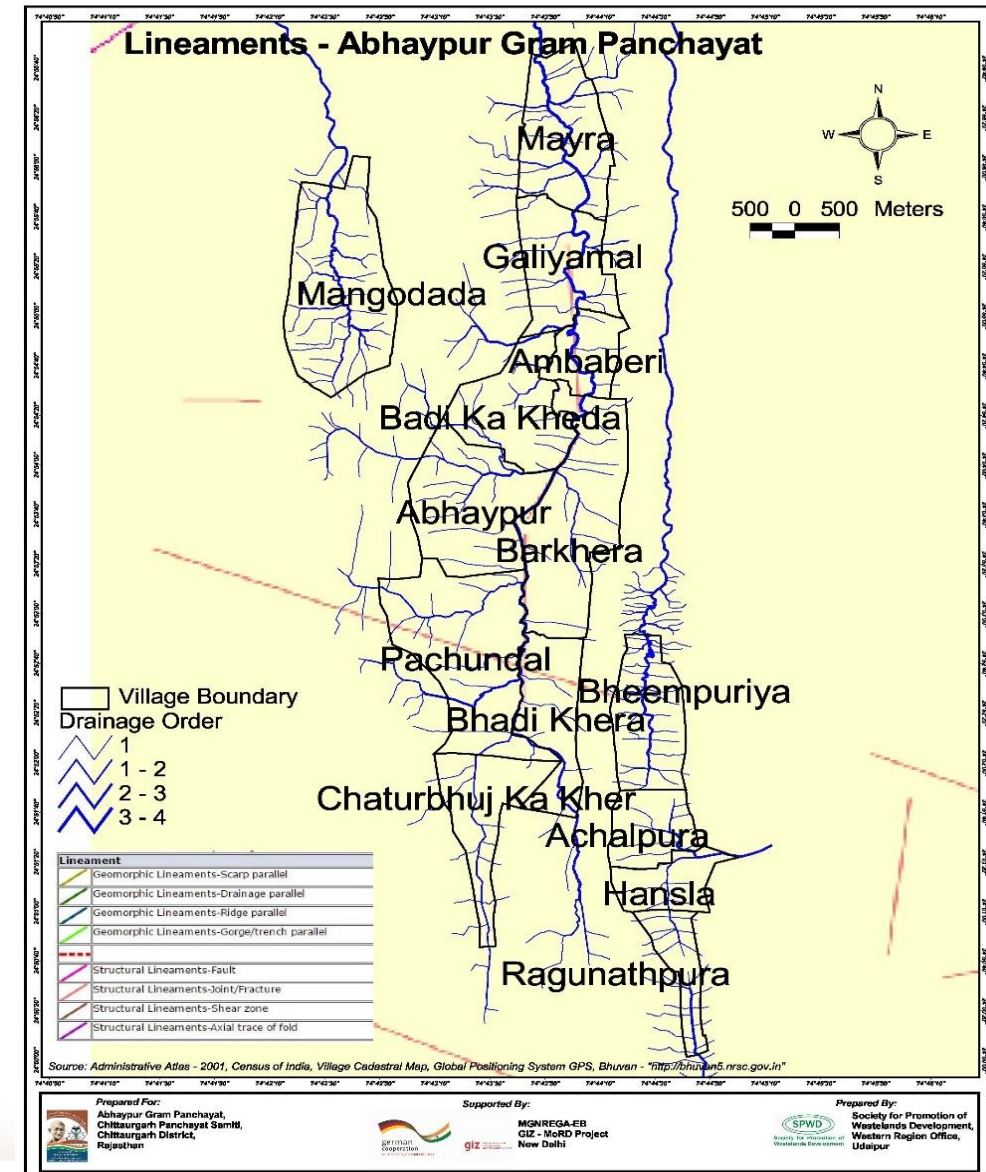


4. Lineament Map:

-The thematic layer were produced from Bhuvan portal and it was accessed through Q-GIS for further processing.

-Lithology and structure map depicts distribution of rocks, bedding planes, folds, faults and lineaments present in an area.

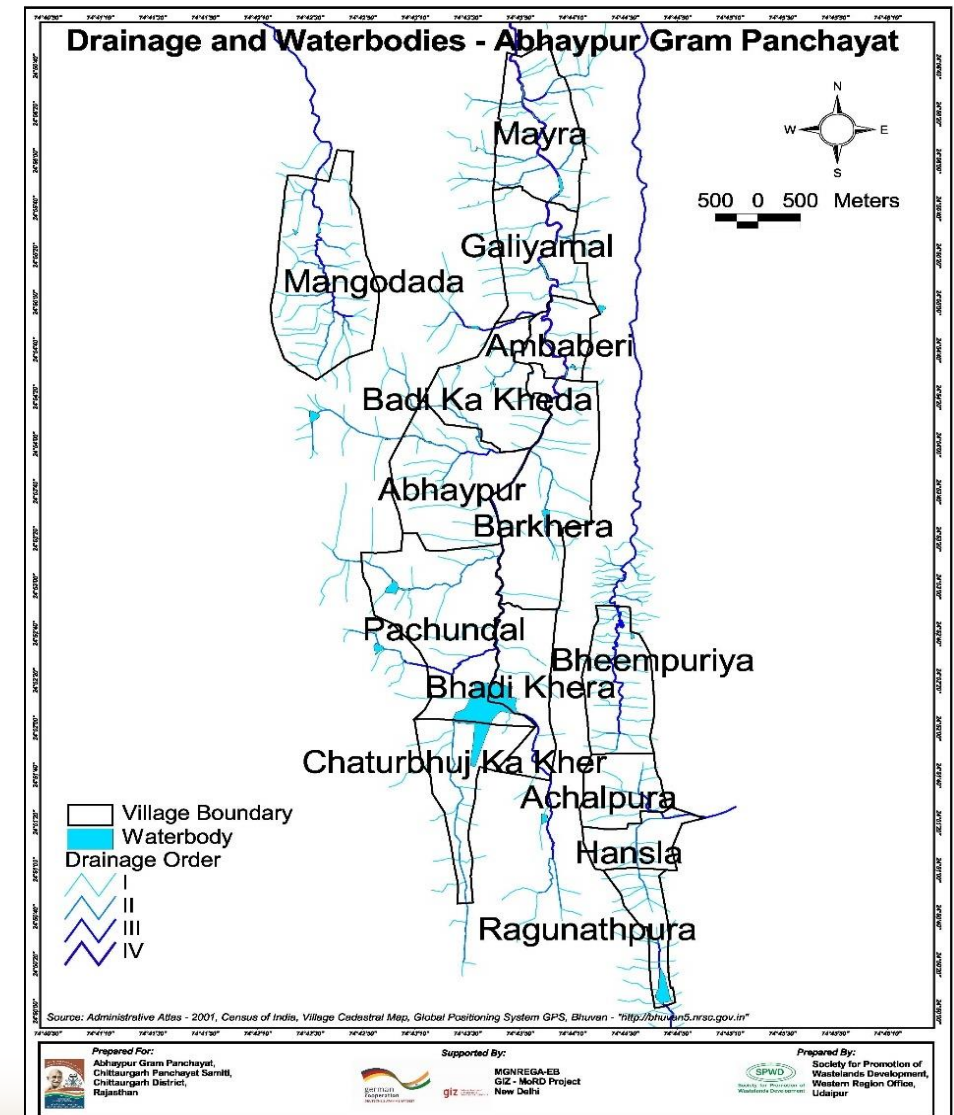
The structural features are particularly important for making decisions related to water conservation, harvesting and recharge measures.





5. Drainage system and surface water bodies map

- The thematic map were generated with the help of Q-GIS for determining water conservation measures in the GP area.
- The drainage pattern shows the direction of water flowing in the area. Since water flows from higher to lower level, the contour helps us in marking the uplands from where the water flows and lowlands up to the point where the water flows



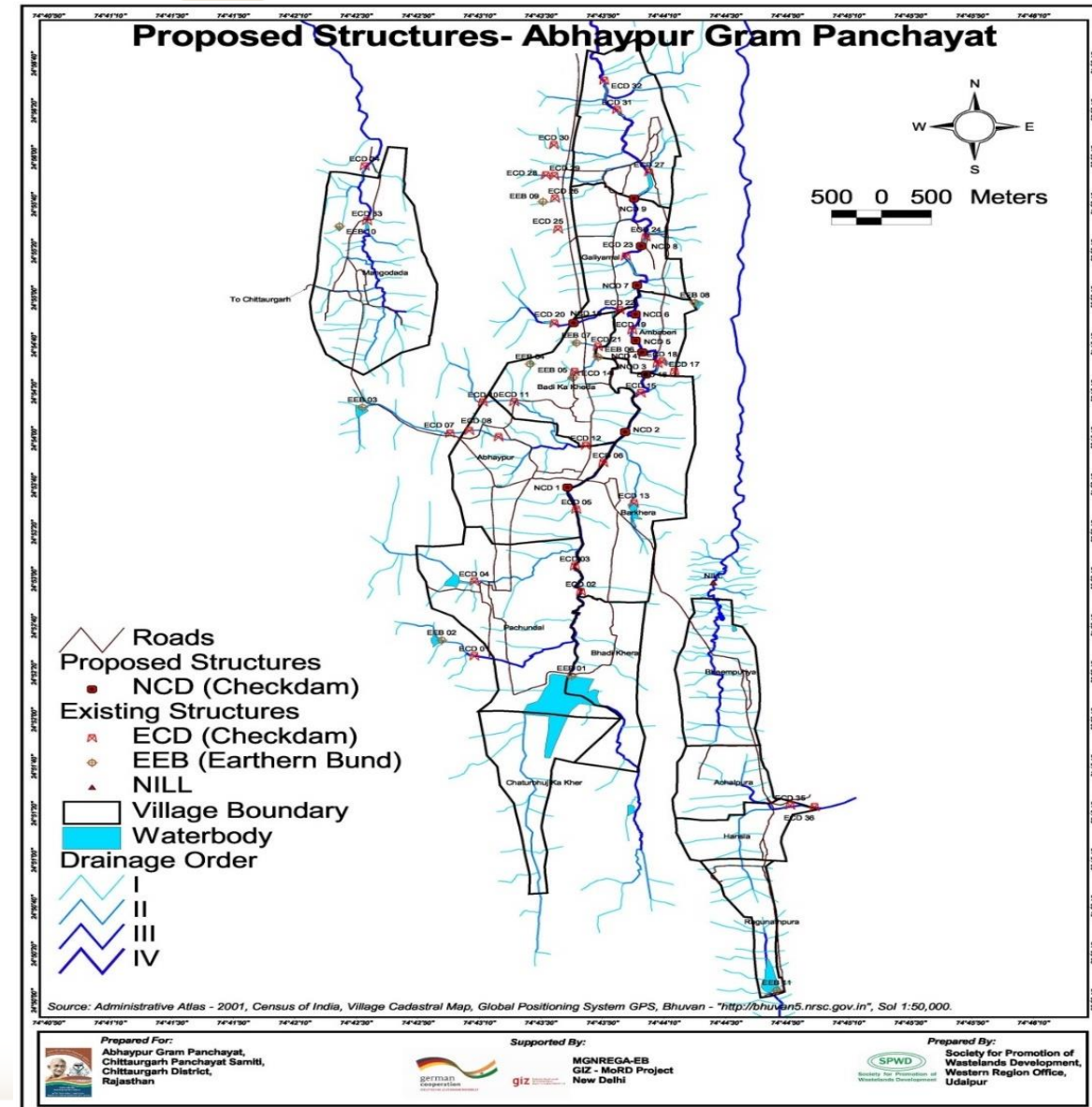
6. Proposed NRM works Map

-The map was generated with the help of Q-GIS through geo-tagging of proposed work sites to analyse and document the importance of the intervention in a GP context.

-The expected outcomes of the intervention could be recorded with the help of this thematic map.

-It is the final map depicting the proposed suitable structures and potential sites.

-After prioritizing the areas of concern, suitable structures were decided and the sites delineated.





Impact/Result

- It helped GPs to quickly develop a five year INRM/watershed based perspective plan – with details of activities
- Annual plans (DPRs) based on budget available were drawn out and helped quick approvals and disbursement – assisting on ground implementation
- The QGIS methodology has subsequently moved to the online Bhuvan platform of National Remote Sensing Center
- This GIS assisted planning process has been rolled out to all 30 provinces/states and will impact MGNREGA planning in about 262,000 GPs at the end of the process



Challenges

- Some functionality is missing compared with the more established commercial software products available, and some workflows that could be improved.
- Mapping takes a little more time for practitioners to get used to. It operates a little differently to other commercial desktop mapping software in that one can create multiple maps from one workspace. The premise behind this way of operating is a good one but it can be a little confusing at first.



Thanks

