

# Narwa, Garwa, Ghurwa and Bari (NGGB) Program Development of Mardapotti Gram Panchayat, Kanker District: A Remote Sensing & GIS Approach

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**Abstract:** Introduction: The principle of Narwa, Garwa, Ghurwa, Bari (NGGB) development aims at sustainable integrated live landscape management for socio-economic development and livelihood creation. It also emphasis on conservation and promotion of agriculture land, livestock, forest and wildlife. The Remote sensing & Geographical Information System plays a vital role to find out the information about suitable place to development and management for Narwa, Garwa, Ghurwa, and Bari (NGGB). Materials and Methods: In this present study IRS Resource sat LISS-IV and Cartosat-1 merge satellite data is used to find out the best suitable place using various parameters like Land use land cover (LULC), Drainage, Soil, Ground water etc. for the development and management of the Narwa, Garwa, Ghurwa, Bari. Land use land cover, Drainage, Soil, ground water etc. map has been prepared from the satellite data as well as Field survey. Results: Some of the plot area (Khasra) of village Iradaah, Malajkudum, Mardapotti has approximate 75.25 ha. land which has potentiality for bari and Gothan. Some check To provide the regional needs like Irrigation, Drinking water some check dam point in Doodh and Kotri river has been selected for better water management system (Narwa) to develop Doodh and Kotri river. Conclusion: A lowland waste land near Gothan and Bari has been selected for Ghurwa development, Gov. took some initiative action for successfully completion of the NGGB programme, Here RS GIS plays a vital role to perfectly and scientifically completion of the programme.

**Keywords:** GIS, Narwa, Garwa, Ghurwa, Bari (NGGB), Remote Sensing

## 1. Introduction

The Chhattisgarh government is determined to strengthen the rural economy by focusing on the development of Narwa, Garwa, Ghurwa, and Bari. Narwa in Chhattisgarhi means natural drainage, Garwa means livestock, Ghurwa means the storage of wastewater and foliage, Bari means small gardening. In order to fulfill this concept, along with the agriculture and allied department of Chhattisgarh government, horticulture, animal husbandry, fisheries. Rural development, water resources, revenue, village industries, energy department will play an important role.

Narwa, Garwa, Ghurwa and Bari scheme, said that the soul of Chhattisgarh dwells in the villages. About 70% of the people live in villages. Earlier, in these villages, prosperity was achieved by investing in labor in natural resources. Gradually the resources are not that labor investment can increase. In the drains, the water in the ponds dried up, the land went waste. In such a situation, we have the resources available in the village, by reorganizing them, we decided that we will be able to fix the resource. Narwa, Garwa, Ghurwa, Bari is a scheme of Chhattisgarh; in 2019 Chief Minister Bhupesh Baghel started the programme. With the help of local resources this programme would be constructed. Through this scheme, the place where animals can roam, eat better fodder. We named it Gothan. It will be the Gothan of the government. It can also be at least 3 acres or more. Ten acres connected with this will be prepared.

Five specific roles of drainage are distinguished food production, agricultural intensification and diversification sustainable irrigated land use, rural development and environmental protection (Lambert K. S. medema et al 2000). Irrigation has always been a priority for India, for which bulk of expenditure has been spent on creation of major and medium irrigation projects. To provide superior irrigation service to the farmers, it becomes important to know at the outset how the farmers perceive the current irrigation service delivery system (Choudhury, Nirmalya 2007).

Organic and biodegradable waste is composting. Composting is a controlled process in which, by the activity of microorganisms living in the soil (bacteria, fungi and etc.), biological and organic waste is converted into a neat humus that does not have an unpleasant odor and which can be used as a fertilizer. Bio-waste rich in nitrogen (50 %): fruit and vegetable residues, peel of fruit and vegetables, coffee and tea dregs, grass cuttings, weeds and plant residues in the garden, withered flowers; Bio-waste rich in carbon (50 %): leaves, chopped brushwood, straw and hay, fruit and grapes pruning residues, sawdust, needles of conifers (Jasmina, et al. 2018)

Home gardens can help us in recycling of household waste specially when a compost pit is developed. Kitchen gardens can be grown in the spaces available at the backyard of the

house or roof or it can be established with joint efforts on a common place or land (Singh, at al. 2018)

Chief Minister Bhupesh Baghel said “Where there is flowing water in drains, where there is abundance of livestock, there is immense potential for the production of organic manure on a large scale by the processing of cow dung and other rural wastes, and where every farmer's house is planted for its own use. In which he produces vegetables, fruits and flowers and likewise strengthens his nutritional and economic condition. My unwavering belief is that by saving “Narwa, Garwa, Ghurwa, Bari”, new life can be communicated in the rural economy of Chhattisgarh.”

#### Narwa

- 1) To water conservation and recharge.
- 2) To meet the domestic need like Irrigation, Drinking water.
- 3) To balance the environment as well as climate.

#### Garwa

- 1) To enhance the Dairy farming
- 2) Minimize Malnutrition.
- 3) Improvement in livestock agriculture.
- 4) Promoting the Organic Farming.

#### Ghurwa

- 1) To promote Swachta Abhiyan.
- 2) To promote composed and use of bio fertilizer.
- 3) Growth of Agriculture production resulted in economic self-sufficiency.
- 4) Environment Conservation

#### Bari

- 1) To promote the nontoxic Farming.
- 2) Plantation of various fruit plant.

## 2. Study Area

The total area of Mardapotti Gram Panchayat is 20.83 km<sup>2</sup>. An approximate coordinate of this Latitude 20° 9'27.02"N to 20°12'37.03"N & Longitude 81°23'44.42"E to 81°27'17.96"E. Mainly included the Mardapotti, Iradaah, Marrapi, Jiwalamari and Malajkudum villages under the Mardapotti Panchayat (Figure 1). The drainage system of the Doodh river is no less than a boon for these three villages. Nevertheless, in the three months of rains, the water-logged crops damage the crops. However, there is not much difference in the rushes of all these villages. There is a commonality among these three villages. Presently there are 5 main dependent villages under the Panchayat. But in the initial stages of the plan, Gothan (Cowshed) is being constructed in Mardapotti village itself.

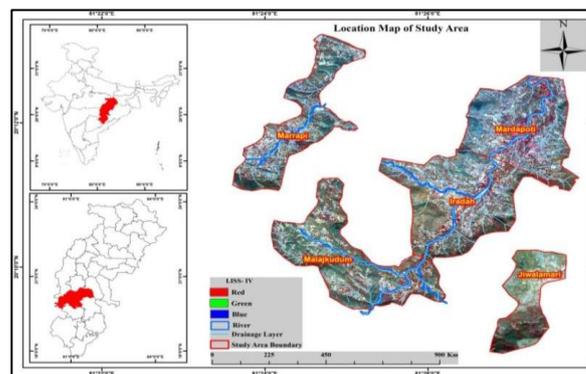


Figure 2: Location map of the study area

## 3. Materials and Methods

Remote Sensing and Geographical Information techniques were applied in this study to depict the methodology. We are used the Survey of India (SOI) Toposheets (1:50000), Toposheets number of the study area is 64H/8. IRS-P6 Satellite sensors LISS-IV image used for the research activity and data interpretation, LISS-IV image (5.8 m) was merged with Cartosat-1 image (2.5m.) Satellite sensors panchromatic images, the output of merge satellite image resolution are 2.5 m. in EARDAS Imagine software. Satellite data with supporting ancillary information used for site suitability of Narwa, Garwa, Ghurwa, Bari (NGGB). Methodology flowchart shown in Figure 2.

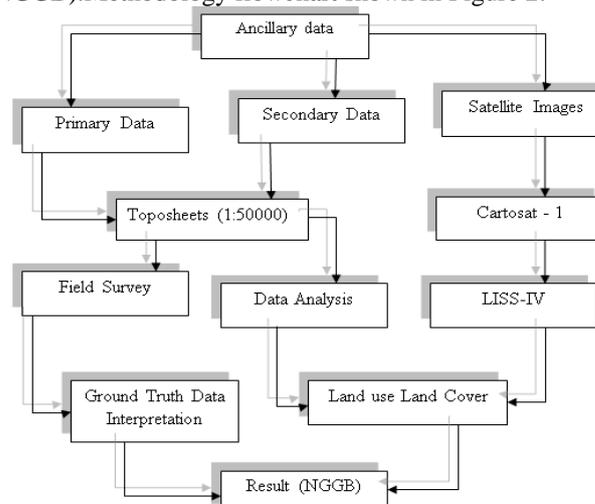


Figure 2: Flow Chart of the Study Region and Depict Methodology.

## 4. Results and Discussions

Land use land cover mapping has been completed with the help of recent data base which is one of the main factor to develop all four scheme and drainage map as well as pasture land map, geomorphological map which also mapped with the help of recent data in GIS platform. The sustainable use of stream, nalah and river on agriculture and bari has been identified with the help of slope, drainage and land use and land cover. The waste generated in the villages does not much damage to the environment, if work is done the right direction, then they can ensure their economic status through livestock. The villagers are able to grow vegetables for their daily needs in their homes their economic stability by exporting vegetable to the weekly markets. All the

information related to the Narwa, Garuwa, Ghurwa and Bari (NGGB) has been collected in the surveyed villages.

**Land use and Land cover:**

The physical area of Mardapotti Panchayat is Part of Kanker is heterogeneous and is a mix between flat land and undulating hills. Most of the land is between 300 and 600 meters above sea level, and about 80% of the area of Kanker is flat. These flat lands can be divided into two parts, the Mahanadi Plane and the Kotri Plane. There are basically six land use classes has been classified according to the bases of the programme these are agriculture crop land, built up, forest, scrub land, Water body Ponds, Water body - Streams/River/Reservoir. The details area of the land use land cover has been shown in Figure 3 and Table 1.

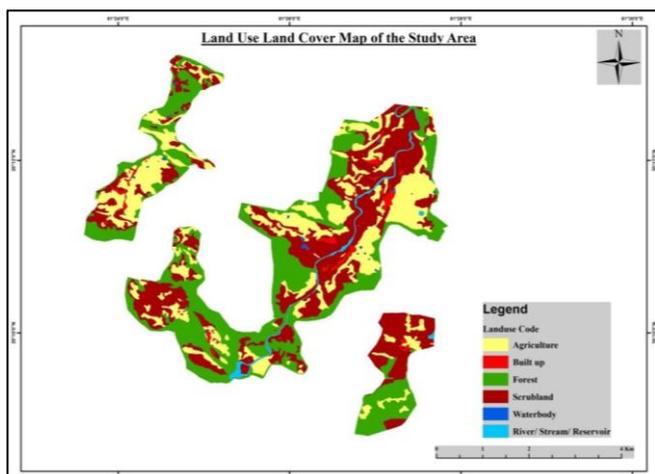


Figure 3: LU/LC Map of the Study Area.

Table 2: Statistics of Land use and Land covers.

LU/LC Class	(Area in Ha.)
Agriculture Crop Land	546.26
Built Up	40.39
Forest	746.60
Scrubland/Grassland	717.39
Water body Ponds	6.95
Water body - Streams/River/Reservoir	35.35

**Drainage System**

Drainage map has been prepared with help of topographical sheets and as well as satellite data. Doodh River, Hatkul River, Sondur River and Turi River all flow through small pockets of hills in the district (Figure 4)

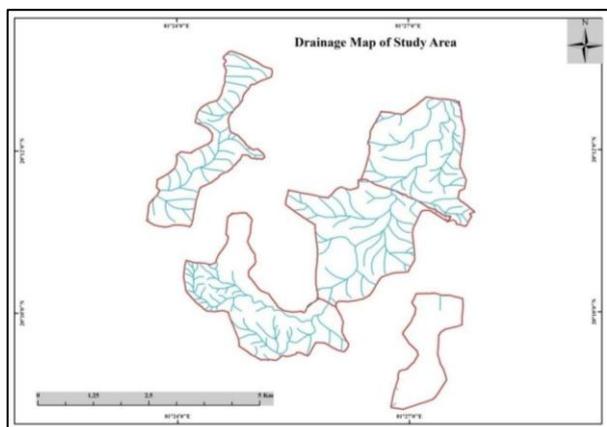


Figure 4: Drainage map of the study area.

**Ground water prospect**

Ground water studies with the help of the Groundwater Prospective map which has been collected from the Chhattisgarh ground water board report (2017). To ensure the use of water in the drain for preservation of ground water and protection under the state government's plan, to protect the cow and cattle livestock, to ensure the use of farmers and the rural economy. Here about 60 percent of the study area under the low ground water prospect zone (Figure 5).

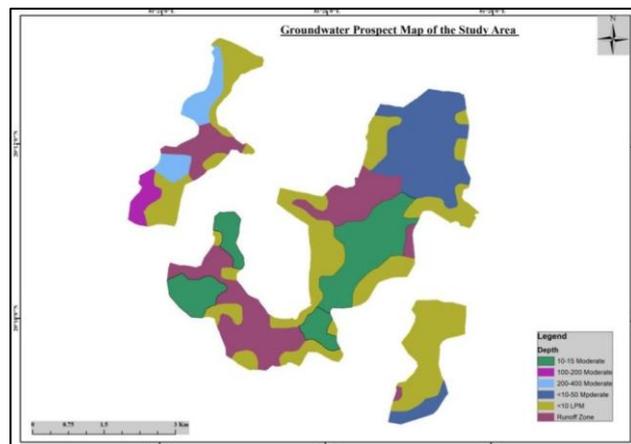


Figure 5: Ground Water Prospect Map of the study area the study area.

**Geomorphology and soil**

The physical area of Mardapotti Panchayat is part of Kanker is heterogeneous and is a mix between flat land and undulating hills. Most of the land is between 300 and 600 meters above sea level, and about 80% of the area of Kanker is flat. These flat lands can be divided into two parts, the Mahanadi other hand Kotri Plane. Most of the area of the study area covered with red soil. The soil is faintly coloured hilly tract, while, the soil is smooth and fertile in the river valleys. Soil map of the study area shown in figure 6.

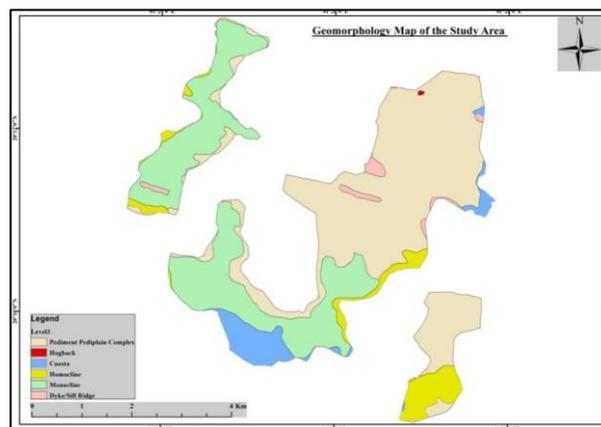


Figure 6: Geomorphology map of the study area

**Work under Narwa program**

Remote Sensing / GIS with the help of technology, on the basis of ridge-to-valley and Land Capability Classification (LCC) on the basis of underground dyke, drainage, pond deepening, renovation of old drains, new stop dam, construction of check dam, protection wall, drain pitching etc. will be helpful. With the construction of new ponds, water can be saved in the village for a long time.

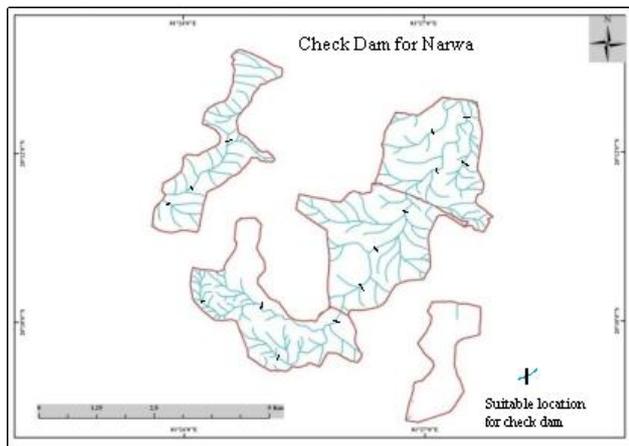


Figure 7: Suitable location for Check dam

**Work under Garwa & Ghurwa program will be done through Gothan**

By selecting 3.00 to 4.50 acres of high land for the construction of Gothan in villages, site with big trees is given priority and special care is taken to ensure that the selected site does not have rainy water filler and a dry place throughout the year. It will be necessary to construct Moorum Road to the way of Gothan, especially for the arrival of animals in the rainy season and for transporting materials and para, sawdust, food items from vehicles. Moorum road should be connected with animal resting platform, animal shed, storage and dispensing and vermicompost. Registered shepherds will be employed to work in Gothan so that their economic condition can improve. Vaccination, treatment, artificial insemination work in animals will be maintained in the register. The cow dung and cow urine etc. of the Gothan animals will be collected and kept in place. Current livestock has been shown in Table 3.

Table 4: Statistics of Current Livestock

Name of village	No. Of livestock
Iradaah	450
Marrapi	120
Malajkudum	200
Mardapotti	150
Jiwlamari	83

**Work under Bari program**

The dung produced by livestock will be used in biogas, compost pit, vermicompost pit will help in biogas plant operation and organic manure making, which will reduce dependence on chemical fertilizer and the tenant cost. Improvement in soil health, environmental protection and human health will be improved and new opportunities for livelihood will be created in the village. Khasra wise land use land cover status which shown the area of being developed as pasture and Bari and some low land area being converted in to Ghurwa.

Table 3: Khasra wise land use land cover status

Village name	Khasra No.	Area in Ha	LULC
Iradaah	243	4.58	Open forest
	364	2.73	Near water
	431	7.42	Barren rocky
	407	1.43	Barren rocky
Mardapotti	167	7.47	Open forest
	172	1.82	Dense forest
Malajkudum	207	8.62	Barren rocky
	219	11.54	Barren rocky
	229	10.19	Grazing land

**Future direction**

A detailed project of work at selected site with public participation in the dependent revenue villages of the selected surveyed Gram Panchayat Mardapotti should be carried out by the technology of remote sensing/GIS.

Underground dike, drainage, pond deepening, renovation of old drains, new stop dam, check dam construction on the basis and on the basis of land capability classification (LCC). Work should be prepared to increase the utility so that to can study old structures. All the structures related to NARWA will be constructed, effective plan should also be prepared for their use and maintenance in the coming years.



Figure 7: Development of Narwa, Garwa, Ghurwa, Bari

**5. Conclusions**

The objective of this paper is to integrated live landscape management (integrated Landscape Management) for sustainable livelihood creation under the NGGB Plan brought by the government. Development in remote areas is possible under this scheme of the Government of Chhattisgarh. Gram Panchayat is a backward area surrounded by Mardapotti Mountains. Here often the problem of drinking water and the problem of sustaining your livelihood have always been there. Water storing and uses of water through drinking and domestic purpose has been sustainable managed by check dam and well and tube well. Pasture land and scrub land will help to make Garwa and some of the plot area (Khasra) of village Iradaah, Malajkudum, Mardapotti has approximate 75.25 ha. land which has potentiality for bari and Gothan. Some check to provide the regional needs like Irrigation, Drinking Water some check dam point in Doodh and Kotri river has been selected for better water management system (Narwa) to

develop Doodh and Kotri river. Making manure and biogas from their waste materials and by saving the vacant space associated with the village houses.

## References

- [1] Bryndal, T. et al. (2020) 'How human interference changes the drainage network operating during heavy rainfalls in a medium-high relief flysch mountain catchment? The case study of the Bystrzanka catchment (Outer Carpathians, Poland)', *Catena*, 194(May). doi: 10.1016/j.catena.2020.104662.
- [2] Burton, R. J. F., Peoples, S. and Cooper, M. H. (2012) 'Building "cowshed cultures": A cultural perspective on the promotion of stockmanship and animal welfare on dairy farms', *Journal of Rural Studies*. Elsevier Ltd, 28(2), pp. 174–187. doi: 10.1016/j.jrurstud.2011.12.003.
- [3] Choudhury, N. (2007) 'Irrigation service delivery in canal systems: A study of eight canal systems in India', *International Journal of Rural Management*, 3(1), pp. 127–148. doi: 10.1177/097300520700300106.
- [4] Fang, H., Sun, L. and Tang, Z. (2015) 'Effects of rainfall and slope on runoff, soil erosion and rill development: An experimental study using two loess soils', *Hydrological Processes*, 29(11), pp. 2649–2658. doi: 10.1002/hyp.10392.
- [5] Golosov, V. et al. (2017) 'Sediment transfer at different spatial and temporal scales in the Sichuan Hilly Basin, China: Synthesizing data from multiple approaches and preliminary interpretation in the context of climatic and anthropogenic drivers', *Science of the Total Environment*. The Authors, 598(9), pp. 319–329. doi: 10.1016/j.scitotenv.2017.04.133.
- [6] Grandgirard, J. et al. (2002) 'Costs of secondary parasitism in the facultative hyperparasitoid *Pachycrepoideus dubius*: Does host size matter?', *Entomologia Experimentalis et Applicata*, 103(3), pp. 239–248. doi: 10.1023/A.
- [7] Igwe, K. and Gloria, F. A. (2014) 'Social and Economic Implications of Home Gardening on the Livelihood of Farm Households in Abia State , Nigeria', 4(1), pp. 66–72.
- [8] Jankar, P. D. and Kulkarni, D. S. (2013) 'A CASE STUDY OF WATERSHED MANAGEMENT FOR MADGYAL VILLAGE A CASE STUDY OF WATERSHED MANAGEMENT FOR MADGYAL VILLAGE Address for Correspondence', (July 2013). doi: 10.13140/2.1.4523.8401.
- [9] JIA, L. guo et al. (2018) 'Potato yield gaps across the rainfed Yin-mountain Hilly Area of China', *Journal of Integrative Agriculture*. CAAS. Publishing services by Elsevier B.V, 17(11), pp. 2418–2425. doi: 10.1016/S2095-3119(18)62034-9.
- [10] Kang, M. et al. (2019) 'Modification of the moving point test method for nighttime eddy CO<sub>2</sub> flux filtering on hilly and complex terrains', *MethodsX*, 6, pp. 1207–1217. doi: 10.1016/j.mex.2019.05.012.
- [11] Musotsi, A., Sigot, A. and Onyango, M. (2009) 'The role of home gardening in household food security in Butere division of western Kenya', *African Journal of Food, Agriculture, Nutrition and Development*, 8(4), pp. 375–390. doi: 10.4314/ajfand.v8i4.19199.
- [12] Schultz, B. and De Wrachien, D. (2002) 'Irrigation and drainage systems research and development in the 21st century', *Irrigation and Drainage*, 51(4), pp. 311–327. doi: 10.1002/ird.67.
- [13] 'ScienceDirect\_citations\_1595072531547''the welfare cows in indian shelters.pdf'
- [14] Wang, B. et al. (2020) 'Reliability analysis of slopes considering spatial variability of soil properties based on efficiently identified representative slip surfaces', *Journal of Rock Mechanics and Geotechnical Engineering*. Elsevier Ltd, 12(3), pp. 642–655. doi: 10.1016/j.jrmge.2019.12.003.