



ROLE OF GEOINFORMATICS IN SITE SUITABILITY ANALYSIS OF INFRASTRUCTURES USING PRA APPROACH

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Abstract: Recent decades have seen significant changes in both local and global development planning efforts. Some of the community based organizations and other social groups targeting the rural community for sustainable development integrates the advantages of geomatics technology and the manpower for the rural development activities. Analysis of natural resources inventory, management and planning the strategy for sustainable development proved to be a powerful effective administrative and management tool as decision making. GIS technique help us to finds the gap of environmental and social challenges and suggest solutions to overcome the problem with spatial technology for gram panchayat planning. The decentralized planning is not possible without the involvement of the public participation. The participatory GIS is a tool that involves the participation of the local group (e.g. farmer, peasants) as well as empowers them and feel them important in the decision making process of their own resource. The scope of the study is to find all the problems of the villagers related to education, health, road, government infrastructure scheme, drinking and irrigation problems etc. This study makes a frame work that helps in better planning at panchayat level. It makes a spatial distribution of natural resources for a better presentation of physical feature of the area, which helps in planning and making of decision support system. The major objectives of this study were to create the geo-spatial database at panchayat level, to generate spatial distribution of natural resources and infrastructure development by using GIS and participatory (approach) techniques to study the gap between existing and not existing services and finally to provide the GIS based decision support system and solution for local governance.

Keywords: GIS, PRA, site suitability, geoinformatics, spatial data, non-spatial data

I. Introduction

In India, Panchayat is a gathering of individuals of the town which make a few principles for the Improvement of the town. It is a primary part of town or gram for conquer individuals' issues. Enabling town (Gram) Panchayat regarding asset database creation and helping them to make utilization of the same for a superior future. Since Panchayat Information Framework (PIS) gives fundamental subtle elements utilizing the Geographical Information System (GIS) for the arranging and the improvement exercises of the neighbourhood [1]. This framework is a GIS based framework which stores all the important data in regards to topographical, property conveyance, arrive allocate, arrange, populace, financial condition, seepage, instruction, water bodies, wellbeing focus and so on at Panchayat level in an area of a state [2]. It gives simple information inquiry, recovery, and refreshing and assumes an imperative part in basic leadership, that aides in the improvement exercises of the divisions like planning, farming, soil survey, soil conservation, irrigation, groundwater, rural development, and so on at Panchayat level [3]. The Panchayat spatial data framework gives increasingly and precise data to the general population for various arranging and advancement of the locale [4]. Presently for the better portrayal of any Panchayat, Participatory GIS play an extraordinary part. Participatory GIS is a spatial basic leadership apparatus intended to use GIS strategy in the setting of the requirements and capacity of groups that are included with and influenced by advancement activities and program [5]. Participatory GIS is considered as a principal Group based Geographic Information assembling, the utilization of various coding techniques takes into account the organization and capacity of topical data layers; this thusly encourages group based investigation of spatially-characterized data and the show of results [6]. The device forms existing information and its yield, giving the establishment whereupon open investment GIS can discharge in its maximum capacity, by showing numerous substances and clashing enthusiasm through the eye of every single concerned partner [7]. Thusly, it can be utilized as a stage for correspondence and dispersal of data which can interface group investment and Geographical data on differing qualities of social and natural setting [8]. The principle reason for participatory GIS methods is to empower advancement professionals, government authorities, and neighbourhood level

individuals to cooperate to arrange fitting projects [9]. This approach draws intensely on ideas created under the wide improvement of GIS as far as information get to, information portrayal and basic learning bending and group strengthening as being intelligent and critical issues in the utilization of group advancement ventures [10]. Participatory GIS handle enables the group by including them in the basic leadership handle. It can be utilized to consolidate subjective and quantitative way to deal with group improvement [11]. Normal asset data can be effortlessly assembled, dissected and come back to the group for use with the assistance of participatory process [12]. The principle proverb of this review is to make a database for long haul advancement arrange for everybody in the arranging condition with the assistance of participatory GIS and speaks to all the critical matter and needs of individual's lives there [13,14]. This work will done utilizing the reconciliation of GIS and participatory approach. The yield gives a legitimate path for examination of the changing of nature and answers for decentralized arranging.

II. Study Area

Rajhana Panchayat is situated in Shimla district of Himachal Pradesh, India. Rajhana is very small naturally beautiful place near to Shimla city. It is bounded by Pagog Panchayat in north, Dhali Panchayat in East, Pujarli Panchayat in south-East, Anandpur Panchayat in South, Rampur Panchayat in south west, Tutu Panchayat in west and Chailly Panchayat in north-west. The geographical extend of Rajhana is $31^{\circ} 06' 22.64''$ N to $31^{\circ} 03' 29.23''$ N latitude and $77^{\circ} 07' 43.85''$ E to $77^{\circ} 11' 37.20''$ E longitude and the total geographical area of this Panchayat is 4.594 sq. km.. The study area has very diverse climate.

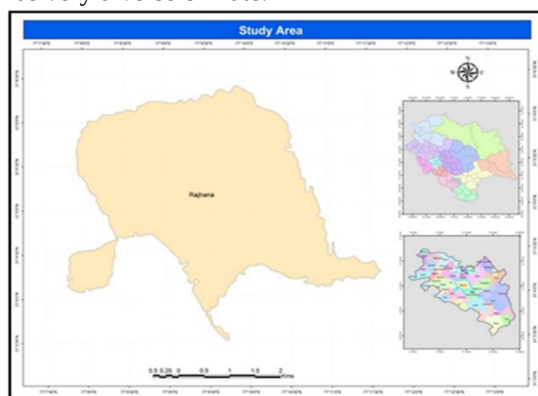


Figure.1 Study area map

III. Methodology

The present review for Panchayat Spatial Information System (PSIS) will for the most part be a mix of two sorts of information, essential and optional information. The blend of essential and in addition optional database helps in better examination and making of geo-database for long haul advancement get ready for everybody in the arranging condition (Fig. 2). In the present consider we will utilize essential and optional informational collections for the examination of study zone. These information are extremely useful in future arranging of Panchayat. In the essential information, we will utilize the information which gather straightforwardly from the review territory for example, soil sort of the region, populace, foundation, proficiency, occupation, PRA and other data. This data is exceptionally useful in arranging and improvement of the zone at Panchayat level. In the optional information, we will utilize remote detected information like satellite image (Cartosat-2), geological sheet of Survey of India (SOI), and toposheets. The Cartosat-2 is a sun synchronous satellite of the spatial determination of under 1 meter resolution. The Survey of India (SOI) geological maps on the size of 1:50,000 will be used to distinct the assessment array. The toposheets on 1:50,000 scales and will be utilized as a contribution for GIS for essential and auxiliary information. To concentrate data from raster information, different GIS programming, for example, Erdas Imagine 9.2 and ArcGIS 10.1, will be utilized.

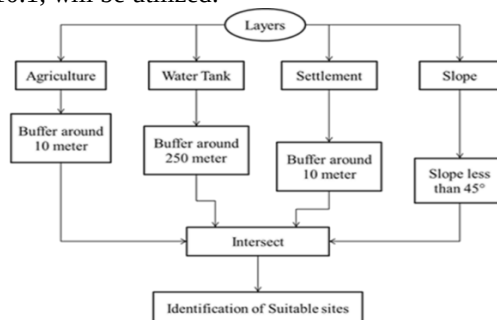


Figure 2: Methodology

IV. Site Suitability Analysis

For the making of PRA guide, the general population of Panchayat cooperated to delineate assets of Rajhana at the Panchayat office. Everyone was accessible to work with a clear sheet of paper and marker pens. The procedure began with an expansive clear sheet of paper on which the Panchayat limit, the land elements, and key vital assets were demarcated. The infrastructures like water tanks, schools, forest, street, Aanganwari, settlement, agricultural area and different assets inside the panchayat were delineated (Figure 3). For the approval of mapping exactness keeping in mind the end goal to survey the spatial precision of the guide highlights drawn by the group individuals from Panchayat, some of these components were mapped utilizing a Garmin Global Positioning System (GPS). This included components available by foot including streets, water sources, houses, Aanganwari, schools and so forth.

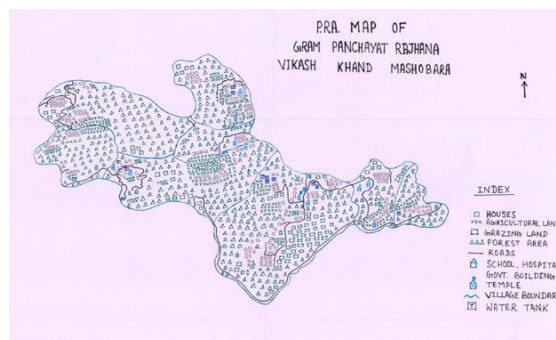


Figure 3: Participatory Rural Appraisal (PRA) map of Rajhana Panchayat

After the completion of PRA map, identification of problems characterised by local peoples of the Panchayat with the help of local community was prepared. The local peoples provided their requirement of daily life. According to their requirement we have delineated a resource map that helps in site suitability analysis. With the help of this resource map we can easily find the gap between people's needs. The black circle represents lacking of resources like road facility, water tank for drinking and irrigation, health centre, schools, etc identified by local people (Figure 4). After the identification of gaps in infrastructure, new site suitability map with help of local community according to their requirement was prepared. The map gives an overview of the site, where new locations for construction of infrastructure can be demarcated which would help in fulfilment of peoples need. This proposed map of Rajhana Panchayat show water tanks, schools, health centres, and road locations that are helpful for the people of this Panchayat. The PRA map were proposed by the local people of the Rajhana Panchayat. (Fig. 5).

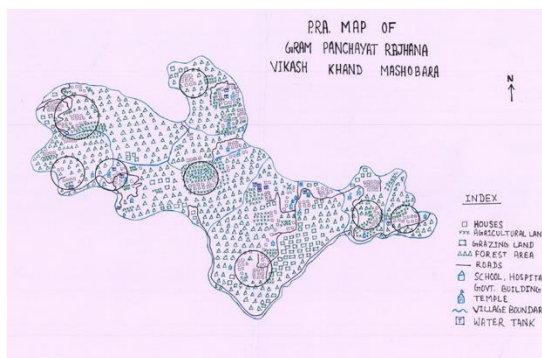


Fig. 4 Circle showing lack of various infrastructures in Rajhana panchayat

The procedure and routine of arranging are getting decentralized to lower range units to make them territory particular and receptive to requirements of nearby individuals. The government lays underlines on drawing up of advancement arranges by grass root institutions, limit working of these establishments and necessity of imparting formative data to the recipients. The gram Panchayat is the establishment of the Panchayat System and it is critical to enable gram. Decentralized Planning is a framework through which arranging is done at various littler regulatory and official levels. Decentralized Planning can be characterized as a kind of arranging where neighbourhood associations and organizations define, embrace, execute activities and direct the arrangement without obstruction by the focal body.

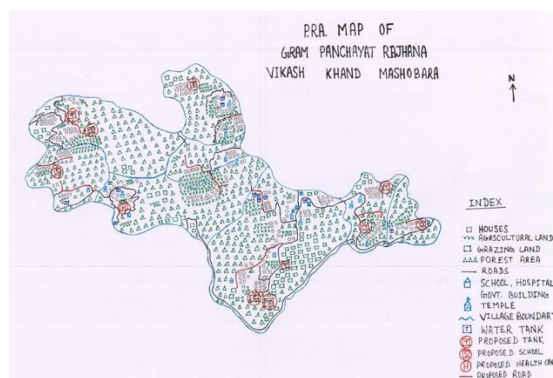


Fig. 5 Site Suitability map as proposed by local people through PRA approach

With regards to advancement, decentralization implies exchange of certain specialist and power in the matter of detailing and usage of improvement arrangements from the most elevated association or foundation at the national level or state level to associations or organizations at the sub-state level. Thus for the best possible improvement decentralized arranging assume an imperative part for advancement of Panchayat. Site appropriateness investigation is a logical methods used to show a lucid picture of how well a specific area is suited for a particular reason. Reasonableness investigation in a GIS setting is a geographic or GIS-based process used to decide the propriety of a given territory for a specific utilize. The fundamental start of GIS reasonableness examination is that every part of the scene has inborn attributes that are in some degree either appropriate or unsatisfactory for the exercises being arranged. Reasonableness is resolved through deliberate, multi-figure examination of the diverse part of the territory. Display inputs incorporate an assortment of physical, social, and monetary variables. The outcomes are regularly shown on a guide that is utilized to highlight regions from high to low reasonableness. At the end of the day, Site reasonableness is the way toward understanding existing site qualities and component, which will decide the area of a specific action. The reason for choosing potential zone for private improvement relies on the relationship of the distinctive component, similar to area of accessible site, degrees of the range, openness, and so forth and site affiliation variables like slants, soil and so on. The examination may likewise decide how those elements will fit into the plan procedure to assess site appropriateness. In field it was observed that the drinking and water system issues are the real issue of the review region. In this setting here we are utilizing GIS instrument to propose an answer for water tank issue. At first we have created obliged model to propose the future arranging arrangement by utilizing Site Suitability Analysis for water tanks in the review zone. The choice of reasonable destinations depends on particular arrangement of nearby criteria. The attributes of a site (Present land utilize, slants, water tank accessibility, settlement, farming, geomorphology, and so forth.) impact its appropriateness for a particular land utilize sort. For any appropriateness examination, fitting base information is required (for the most part satellite information or air photographs, topographic maps and topical maps and field study information). The distinctive land qualities, which can be considered for reasonableness displaying, show arrive utilize/arrive cover, slop, closeness of transpiration system, and so forth, Proposed PRA map of required infrastructure As indicated by this review most appropriate site for water tank is close to settlement and waste/open land.

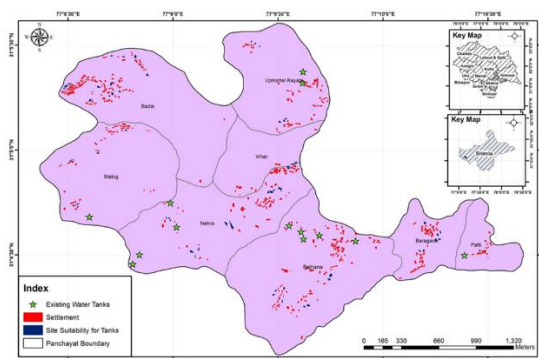


Fig. 6 Map showing suitable site for water tank on settlement through GIS technique

The incline of this area additionally helps in finding reasonable destinations for water tanks. In Badai there are a few destinations which are appropriate for water tank. In this town there is nobody water tanks accessible. A few sections of Rajhara are additionally appropriate for development of water tanks. In Baragaon, bunches of appropriate locales finds for water tanks. Fig. 6 speaks to all the reasonable locales for water tanks which are valuable for water system and in addition drinking reason.

V. Conclusion

The community databases generated in this study from integrated use of PRA and GIS approaches are proving useful for participatory rural development planning. With the help of local participants were able to generate accurate maps of key community resources, use these maps in development planning, and successfully attract funding for new community development initiatives. The results of this study indicate that expanding the integrated use of GIS and PRA to additional communities that are familiar with participatory planning methods is likely to yield similar benefits. Moreover, combining PRA and GIS approaches could have important positive impacts on equity and efficiency in rural development planning. The integrated use of these two tools addresses a fundamental constraint faced by Rajhana communities in undertaking rural development planning. The results of this study show that, GIS-based resource maps can promote increased equity by guiding development to areas of the community with the greatest need rather than those with the most political pull. Retaining the databases and maps should also increase efficiency and reduce costs at many different planning levels, by eliminating the need to recapture the same data at the start of each planning cycle. The experiences documented in this Rajhana study demonstrate that it is feasible to bring the two approaches together, so that the science of digitized spatial information is blended with popular social surveys. The study describes an approach that was successfully used to introduce maps generated by outside experts without confusing participants, thus countering the criticism often heard that participatory social surveys are only “outsiders confusing local communities without any useful results from the process”. The tools of PRA and GIS can work together to help develop information systems and forge stronger bonds between the discipline of information management and the social purpose that such information is meant to serve. Realizing the benefits of decentralization requires the integration of participatory methods and modern information technologies at all levels of planning authority. While the study suggests that integrating PRA and GIS at the parish level is feasible, this integration will mean little unless similar social and information techniques are also adopted at higher levels of planning authority. If integrated planning from village to nation is to be successful, the information will need to be developed and shared across scales. Increased awareness is needed within this country of the potential benefits of integrating PRA and GIS approaches in local development planning. Hence PRA and GIS both play a considerable role for the development of the nation at a grass root level. It also connects people to their growth and community.

VI. References

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