Perspective of Planners and Local People on Socio-Economic Factor

Sajan Krishna Tamrakar [a], Sanjaya Uprety [b]

[a, b] *Department of Architecture, Pulchowk Campus, IOE, Tribhuvan University, Nepal*
Corresponding Email: [a] tamrakar.2021@gmail.com, [b] suprety@ioe.edu.np

Abstract
Urbanization is an inevitable process where people shift from rural to urban settlements changing the built environment. People manipulate land as per their requirement. Since land is a scarce resource and demands for urban development is more than the land available which is evidently increasing in developing countries The need of people is the factor that drives the planning process, and they are the one who has to live with the result. Multi-criteria evaluation is process of applying the decision rules where several criteria will need to be evaluated to meet a specific objective. Analytic Hierarchy Process is the commonly used multi-criteria evaluation process used worldwide in a wide range of decision circumstances. This paper highlights the difference of perspective on socio-economic factors of experts involved in planning and local people. Further it suggests on possibilities for methodological improvement that needs to be considered for making planning process more participatory.

Keywords
Multi-criteria Evaluation (MCE), Urbanization, Socio-economic, Analytical Hierarchy, Process (AHP), Participatory planning

1. Introduction

Urbanization is a process in which the population shift from rural to urban settlements changing the built environment. This process eventually causes change in people's lifestyle, occupation and culture. And over the next several decades, the world's population is anticipated to expand significantly further, with nearly all of it transpiring in urban centers of poor countries [1]. Nepal is one of the ten least urbanized countries in the world with 19.7% population urban in 2018. Nevertheless, it is second fastest urbanizing countries after Burundi. Burundi is expected to urbanize fastest in the future decades, at a pace of 2.4 percent on average each year, followed by Nepal and Malawi, both at 2.0 percent per year [2].

The country's unplanned urbanization has introduced new challenges for urban planning and rehabilitation. With the growing demand for land, l and use planning and land appraisal have become more significant as people try to make better use of limited land resources. And, because there are limited resources to preserve urban areas, GIS-based land suitability assessment is used as the analysis technique for land evaluation in the land use decision-making process.

Procuring a new site for urban expansion or renovation is getting more difficult, especially in a competitive real estate market with strict environmental requirements and laws. An important element in any urban and suburban planning and decision-making process is land use suitability assessment. And, as an outcome of the site suitability assessment, a thorough display of the most-suitable regions for consideration of facility placement is produced, while unusable or less desired sites are filtered out [3].

Since manual process is a long-term process to survey or analyze site suitability analysis process [4], the selection of appropriate sites should be based on a set of criteria based on local norms, with a score and weighting system applied to the various components of suitability to determine the overall suitability for a particular urban use[3].

Even though the physical factors identified from rational approach are universal but socio-economic factors cannot be defined in the same approach. Socio-economic factors are highly influenced by the

context and surroundings so participation of local people is important for identification of such factors. As perspective on socio-economic factors of planners and local people vary so it is important to consider perspective of both planners and local people for site suitability analysis

2. Research Objective

The objective of the study is to analyze the perspective on weightage of socio-economic factors considered by expert in Risk Sensitive Landuse Plan of Changunarayan Municipality, planners and people of study area for site suitability analysis for urban development.

3. Methodology

As the research is based on both qualitative and quantitative data, pragmatic paradigm with mixed method was considered for conducting this research. It used literature reviews to understand use of techniques for analysis of data obtained. Changunarayan municipality has been taken in the study for perspective on weightage of socio-economic factors. Primary data were collected from questionnaire and interviews conducted physically and online. Data from consultant of Risk Sensitive Land Use Planning (RSLUP) of Changunarayan was collected form the interview.

Similarly, data for perspective of local representatives were also collected via interview of some representatives from Changunarayan municipality. Perspective of other practicing planners were collected online with Kobo Toolbox. Secondary data were collected from literatures. Finally, analysis of weightage of socio-economic factors considered by consultant of RSLUP, practicing planners and local people for site suitability analysis for urban development was done followed by drawing the conclusion on disparity of perspective on weightage of socio-economic factors and methodological improvements that needs to be considered to make planning process more transactive.

4. Literature Review

4.1 Urban Area

An urban area, also known as a built-up area, is a human community with a high population density and built-environment infrastructure. Urban areas are formed as a result of urbanization and are classified as cities, towns, conurbations, or suburbs based on their urban morphology. The concept of urbanism contrasts to rural regions such as villages and hamlets. Urbanization is a process in which the population shift from rural to urban settlements changing the built environment. This process eventually causes change in people's lifestyle, occupation and culture. According to UN Population Division estimations, by 2030, each of the major developing global regions will have more urban than rural people; and by 2050, almost two-thirds of their population would likely live in urban regions. Likewise, according to statistics from UN Population Division 2017, the population of the cities and towns are expected to be 3.90 billion and 5.26 billion by 2030 and 2050 respectively which was 1.97 billion in the year 2000.

4.2 Land Use Planning

Land use is the modification of land to meet people's needs. Because land is a limited resource, there is a greater demand for arable land, forestry, wildlife, tourism, and urban development than there is of available land in emerging nations [5]. Human's basic needs are catered by the land. So, as the world's population and goals grow, land becomes a more valuable resource. A land use plan is an organized assessment of land, land use alternatives, and economic and social situations to choose the optimal land-use decisions that will meet people's needs while also protecting resources for the future. Land use planning is a method for resolving conflicts between specific land uses and long-term environmental sustainability [6]. It has four basic focuses which are discussed below

4.2.1 Planning is for people

The need of people is the factor that drives the planning process and they are the one who has to live with the result. Therefore, it should be positive and done with profound knowledge of social, economic, cultural condition of people. Local participation in planning is the most effective way to obtain local acceptance.

4.2.2 Land is not the same everywhere

Land is fix resource which cannot be moved like capital, labor, management skills and technology. Hence, land-use planning requires accurate information on land resources.

4.2.3 Technology

Land is consumed for agronomy, silviculture, livestock husbandry and other means. The technologies recommended contextual as per the capital, skills and other necessary resources.

4.2.4 Integration

Land-use decisions are determined not only based on land suitability, but also on the basis of product demand and the degree to which a given area's usage is important for a certain purpose. Planning must take into account the land's appropriateness, demand for alternative goods or uses, and the options for meeting those needs on the available land, both now and in the future.

4.3 Land Suitability Analysis and GIS

The fundamental physical setting for the sustenance of life and other terrestrial living forms is provided by land. Land suitability assessment is a planning approach that was developed to relate spatially independent factors within the environment and, as a result, provided a more holistic view of their interactions. It was developed to avoid environmental conflicts by segregating competing land uses and was developed to relate spatially independent factors within the environment and, as a result, provided a more holistic view of their interactions [6].

GIS has evolved through three broad application domains. Firstly, coordinating and accessing geographic data. Subsequently, analyzing map layers with regards to logical and mathematical relationship (i.e., modeling) to yield new derivative maps. Finally, GIS as a decision support system-a means for deciding how to act upon the maps produced [7]. The GIS-based methods to land- use suitability analysis by hand-drawn overlay techniques used by American landscape architects in the late nineteenth and early 20th century which McHarg (1969) advanced the overlay techniques by recommending a procedure that involved mapping data on the natural and human-made attributes of the environment of a study area, and then presenting this information on individual, transparent maps using light to dark shading (high suitability to low suitability) and superimposing the individual transparent maps over each other to construct the overall suitability maps for each land use [8].

The mapping and analysis of land use suitability is a

beneficial use of GIS. Ecological approaches for defining land suitability/habitat for animal and plant species, geological favorability, suitability of land for agricultural activities, landscape evaluation and planning, environmental impact assessment, selecting the best site for public and private sector facilities, and regional planning have all used GIS-based land-use suitability analysis [8]. GIS is discovered to be an unique construction emerging from discussions based on science, technology, and society. Despite the fact that much of the material published by GIS experts emphasizes a universal toolset, regionally contingent and complicated social factors result in a distinct GIS each time [9].

The connection between GIS and society, which has the potential to advance the role of information technology in land-use suitability assessments, is a major issue of debate. The original data is evaluated and analyzed at various stages of the process to create information helpful to those participating in the planning process. The data are progressively converted into information that determines the need and the nature of the information required. Information obtained is distinguished in 2 types: hard and soft. Hard information is referred as objective whilst the later one is subjective [8].

Hard data, such as census data, remote sensing data, and meteorological surveys, are gathered from reported facts, quantitative estimations, and systematic opinion surveys. Soft data represents interest groups' and decision makers' views (preferences, priorities, judgements) based on intuition, ad hoc surveys, questionnaires, remarks, and other sources. As a result, social values and political considerations are factored into the decision maker's calculus, and this information is employed in the planning process. Therefore, the planning process should include both hard and soft data. This means that GIS must be able to integrate soft data into traditional map-based GIS operations in order to be effective in addressing queries about land-use suitability analysis. Soft data is produced through a public debate between interest groups and individuals who are impacted by public or private sector development and management activities. One can suggest that information systems for planning in general and land-use suitability analysis in particular should be constructed with at least two interrelated perspectives in mind:

- Techno-positivist perspectives on GIS
- Sociopolitical, participatory GIS perspectives

4.4 Multi Criteria Evaluation (MCE)

Evaluation is process of applying the decision rules where several criteria will need to be evaluated to meet a specific objective [7]. Such procedures are called multi- Criteria Evaluations sometimes referred as modeling. There are 3 hierarchies in MCE approach. They are as follows:

4.4.1 Decision

The decision is a choice between objectives hence it is also referred as overall objectives. To exemplify, an overall objective might be identifying suitable and economic site for industries. Here, the decision is based on suitability and land cost.

4.4.2 Objectives

An objective is a viewpoint that guides the development of decision rules. In aforementioned decision, the factors determining the decision are suitability of site and cost of the land. Therefore, identifying suitable land and identifying land cost are 2 different objectives of study.

4.4.3 Criterion

A criterion is the basis that can be measured and evaluated. Criteria can be of two kinds: factors and constrains. Generally, they are based on expert's opinion and opinion from government bodies. Criterions for aforesaid objectives can be slope, accessibility to transportation, proximity to urban centers, cost of land etc. further, these criteria are divided into factors and constraints.

- Identifying Constrains:

  Constrains are the area that restrict the analysis only to areas of interest. These completely restrict land for development despite of any values for other factors. Some constrains that are considered in suitability analysis are land with slope greater than 70-degree, wetland, water bodies and forest.

- Identifying Factors

  The variables of factors are the buffer areas of factors which depicts the impact changes of factors to the adjacent places. The points

obtained refers the suitable degree of the variables. Multiple ring buffers are created to identify the scale of suitability of the selected variable. Some examples of factors are slope, proximity to road, urban nodes, market place, hospitals and schools.

4.5 Types of Multi-Criteria Evaluation

Two of the most common procedures for multi-criteria evaluation are:

4.5.1 Concordance-discordance analysis

In this method each pair of alternatives is analyzed for the degree to which one out ranks the other on the specified criteria. It is computationally impractical when a large number of alternatives is present (such as with raster data where every pixel is an alternative).

4.5.2 Weighted linear combination

In weighted linear combination method, each factor is multiplied by a weight and then summed to arrive at a final suitability index. Since it is the derivation of the weights, within the context of the decision objective This is very straightforward in a raster GIS. With a weighted linear combination, factors are combined by applying a weight to each followed by a summation of the results to yield a suitability map.

Although there are a variety of approaches for developing weights, one of the most promising appears to be Saaty's (1977) pairwise comparisons, which were created in the context of the Analytical Hierarchy Procedure, a decision-making process(AHP) [7].

4.6 Analytical Hierarchy Process

The Analytic Hierarchy Process (AHP) was developed by Saaty (1980) and is also known as the Saaty technique. It's very useful for group decision-making, and it's utilized in a wide range of decision-making circumstances across the world, including government, business, industry, healthcare, shipbuilding, and education. Rather than prescribing a "right" answer, the AHP assists decision-makers in identifying the option that best fits their purpose and understanding of the issue. It provides a complete and reasonable framework for organizing a decision issue, representing and quantifying its parts, linking them to broader goals, and assessing potential solutions. The objective of a decision at the top of the AHP hierarchy

of a decision problem is a gradual declining level of decision elements, with each level linked to the next higher level [10]. A pairwise comparison matrix is designed on a nine-point continuous scale from the AHP hierarchy for suitability map. The rating standards is crucial part of this model which is determined on the basis of the literature review, Planning Standards and Guidelines, and also the opinions of experienced planners [11].

After the hierarchy has been established, the decision makers systematically examine its many parts by comparing them two at a time in terms of their influence on a hierarchy element above them. The decision makers can utilize specific facts about the elements to make the comparisons, but they usually rely on their judgements about the elements' relative meaning and relevance. The AHP is built on the idea that human judgements, rather than merely the underlying data, may be employed to complete the evaluation. The AHP transforms these judgments into numerical values that may be analyzed and compared throughout the problem's whole spectrum. Each element of the hierarchy is assigned a numerical weight or priority, allowing diverse and sometimes incommensurable components to be compared in a reasonable and consistent manner. This feature sets the AHP apart from other decision-making methods.

Intensity of importance	Definition	Explanation
1	Equal importance	Two factors contribute equally to the objective
3	Somewhat more important	Experience and judgement slightly favour one over the other.
5	Much more important	Experience and judgement strongly favour one over the other.
7	Very much more important	Experience and judgement very strongly favour one over the other. Its importance is demonstrated in practice.
9	Absolutely more important.	The evidence favouring one over the other is of the highest possible validity.
2,4,6,8	Intermediate values	When compromise is needed

Figure 1: The Saaty Rating Scale

In the last stage of the process, numerical priorities are determined for each of the decision alternatives. These figures indicate the alternatives' relative capacity to fulfill the decision goal, allowing for a quick comparison of the various options.

5. Risk Sensitive Land Use Plan of Changunarayan Municipality

Risk Sensitive Land Use Plan (RSLUP) of Changunarayan Municipality was implemented through "PRAYAS- Promoting new Resilience Approaches in Younger and Smaller Municipalities". RSLUP recognizes the safest zones for prioritizing immediate investments in urban development and infrastructure projects. Changunarayan Municipality suffered huge damages by the 25th April 2015 earthquake (Mw= 7.8) and 12th May 2015 aftershock (Mw=6.9) epicentered in Sindhupalchowk district. Development of RSLUP and building-bye laws will enable the municipality to sustainably and safely plan its growth as well as build resilience against disaster and climate change impacts.

RSLUP approach evolves from generation of relevant baseline information; multi-hazard, vulnerability and capacity assessment; adaptation of best practices, participatory planning and mainstreaming into development activities with participation of stakeholders and concerned in collaborative decision making [12]. The use of spatial information on hazards and vulnerability and integration of spatial planning with participatory planning using spatial analysis approaches is a paradigm shift from the conventional urban planning process in Nepalese context.

Changunarayan municipality has an immense potential for rapid growth brought by urbanization. Further, it has high potential for tourism. It's location adjacent to Kathmandu and Bhaktapur is required to avoid haphazard urbanization.

The long-term development vision of the municipality is guided by its aspiration to achieve sustainable economic, social and physical growth, catalyzed by guided development of urban form through land use planning.

5.1 Factors for Spatial Multi Criteria Evaluation

A Spatial Multi-Criteria Evaluation (SMCE) approach was adopted to assess spatial criteria which includes constraints and factors.

5.1.1 Slope

Flat areas are recommended for constructing infrastructures and housing projects and areas above 30° slope is not suitable for housing projects. However, in mountainous terrain area, it is hard to find flat areas; therefore, slopes less than 10 degree are considered as highly suitable for settlement area.

5.1.2 Distance to Existing Roads

Areas that are near to existing roads are highly suitable for settlement areas as it reduces traveling time and cost.

5.1.3 Distance to Existing Settlements

People prefer to stay near existing settlements for several reasons such as social bonding, security etc., therefore, areas that are near to existing settlement are highly suitable compared to areas that are far.

5.1.4 Distance to Existing Commercial Areas

Closeness to commercial areas such as market centers, weekly market, department store or local shopping street also influences the preferences for settlement areas. People prefer to stay near commercial areas because of the easy access to local markets for daily needs, therefore, areas that are near to commercial areas are considered suitable.

5.1.5 Distance to Existing Urban Nodes

Urban nodes are urban centers where development activities are promoted. In these areas, investments in urban infrastructure and services are prioritized for a planned growth. There are high possibilities of settlement growth in the vicinity of the urban nodes.

5.1.6 Distance to Existing Institutional Areas

People prefer to stay near institutions areas for several reasons, therefore, areas that are near to existing institutional areas are highly suitable.

5.1.7 Distance to Cultural and Heritage Sites

In Hindu culture, people worship different gods. They worship gods in home at the family shrine or at the local temple. Some people go to temples daily to worship gods. During different festivals also, people visit different temples. Not only Hindus, people of other religion also visit holy shrines like monasteries, church. Therefore, people prefer to stay near the cultural area. Based on experts' opinion and ideas from local people, AHP was carried on from which the weightage for distance to existing road, settlement, commercial area, urban nodes, institutional area and cultural and heritage zone were calculated at 40.90%, 25.84%, 15.00%, 8.69%, 4.88%, 2.85% and 1.84% respectively.

6. Discussion

Data from consultant of RSLUP of Changunarayan was collected form the interview. Similarly, data for perspective of local representatives were also collected via interview of 8 representatives from Changunarayan municipality. Perspective of other practicing planners were collected online with Kobo Toolbox. Total number of 56 perspective were collected.

Firstly, from the data from practicing professionals, individual pairwise comparison of socio-economic factors was carried on with AHP and average was calculated. Similarly, weightage from local people and consultant of RSLUP Changunarayan was conducted which is shown in Figure 2.

Distance to Existing	Consultant of RSLUP Changunarayan	Practicing Planners	Local people
Roads	40.44%	18.70%	44.79%
Settlements	20.25%	14.46%	15.75%
Commercial Areas	19.15%	17.61%	7.57%
Urban Nodes	9.13%	20.25%	12.32%
Institutional Areas	6.19%	15.15%	9.38%
Cultural/Heritage Sites	4.84%	13.82%	10.18%

Figure 2: Perspective of consultant of RSLUP, practicing planners and local people on socio-economic factors

From the data it is evident that planners' weights are consistent in all the factors while the weightage considered by consultant of RSLUP and local people vary. Weightage of distance to existing road provided by consultant and locals are similar which is 40.44% and 44.79% respectively.

However, huge disparity is observed in terms of distance to commercial area and cultural and heritage sites. Consultant valued proximity to commercial area more at 19.15% which is only 7.57% for local people. On the contrary, consultant valued proximity to cultural and heritage area less at 4.84% which is 10.18% for local people.
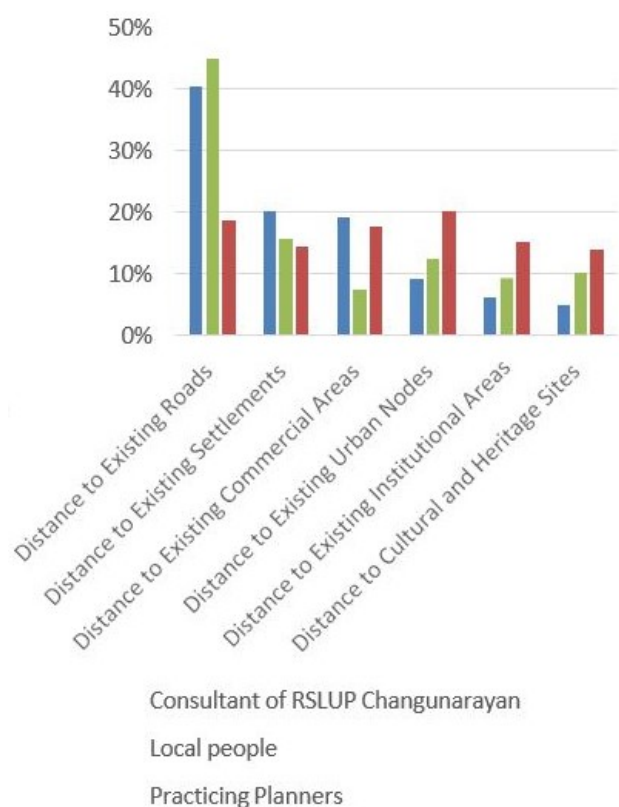
Figure 3: Perspective of consultant of RSLUP, practicing planners and local people on weightage on socio-economic factors
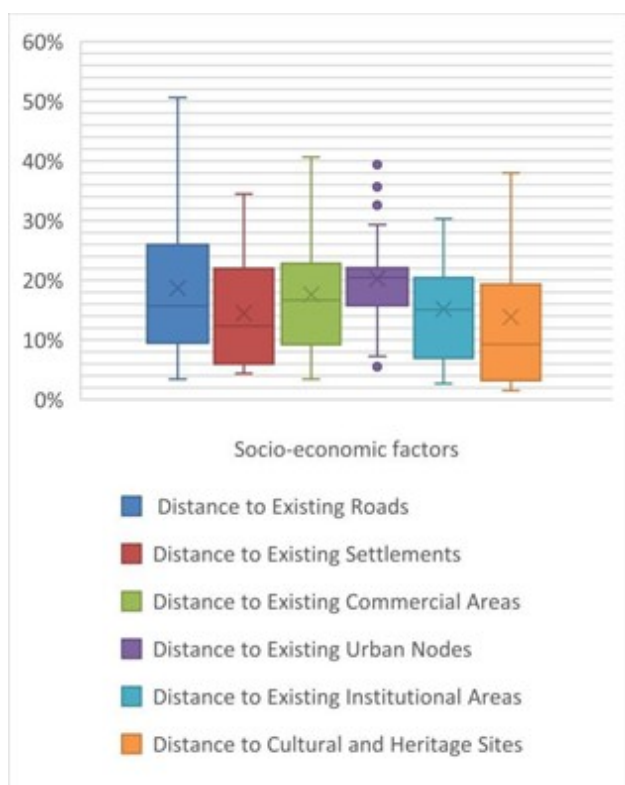

Figure 4: Weightage of socio-economic factors considered by Practicing Planners

7. Conclusion and Recommendation

Local residents are the people who have to live in the area and face the consequences of any planning carried out. Planners are medium to develop plans according to the need of people. From the research, we can see that the weights assigned to socioeconomic factors by locals and planners of different experience are similar in some context and vary in others. The relative weights assigned by planners with high level of experience are similar to the perspective of local residents but contrasting results were found in case of novice planners. Experience of planners is a key factor that leads to making of contextual plans. Similarly, weights assigned by RSLUP consultant were more parallel with the weightage assigned by local individuals because of the contextual information and data that consultant collect during their study. From the interview with the consultant, it was clear that several meetings were conducted in municipal level to study the need and potential of the area. So, study of local context and interaction with local people leads to circumstantial plans.

Also, transactive approach with proper identification of group of people with the knowledge in local context is advantageous for better planning. This is because unlike physical opportunities, socio-economic depend on the convenience and lifestyle of people. And, participation in municipal level has helped generate plans that fulfill local needs. So, promoting transactive approach can help cater the needs of local people.

Acknowledgments

References

[1] Mark R. Montgomery. The urban transformation of the developing world. *Science*, pages 761–763, 2008.

[2] United Nations Department of Economics and Social Affairs. *World Urbanization Prospects*, 2019.

[3] Manish Kumar and Vasim Riyasat Shaikh. Site suitability analysis for urban development using gis based multicriteria evaluation technique. *Journal of the Indian Society of Remote Sensing*, pages 417–424, 2016.

[4] Sandip Patil and Manisha Jamgade. Site suitability analysis for urban development using gis base multicriteria evaluation technique in navi mumbai, maharashtra, india. *International Journal of Advanced Research in Engineering and Technology (IJARET)*, pages 55–69, 2019.

[5] Food and Agriculture Organization. *Guideline for Landuse planning*, 1993.

[6] Yao Mu. *Developing a Suitability Index for Residential Land Use: A case study in Dianchi Drainage Area*, 2006.

[7] J. Ronald Eastman, Weigen Jin, Peter A. K Kyem Kyem, and James Toledano. Raster procedures for multi-criteria: Multi objective decision. *Photogrammetric Engineering and Remote Sensing*, pages 539–547, 1995.

[8] Jacek Malczewski. Gis-based land-use suitability analysis: a critical overview. *Progress in Planning*, pages 3–65, 2004.

[9] F Harvey and N Chrisman. Boundary objects and the social construction of gis. *Environment and Planning A: Economy and Space*, pages 1683–1694, 1998.

[10] Jing Jiang. *Analysis of the Suitable and Low-Cost Sites for Industrial Land Using Multi Criteria Evaluation: A Case of Panzhihua, China*. 2007.

[11] Hao Wang, Qiping Shen, and Bo-sin Tang. Gis-based framework for supporting land use planning in urban renewal: Case study in hong kong. *Journal of Urban Planning and Development*, 2015.

[12] Changunarayan Municipality. *Risk Sensitive Land Use Plan of Changunarayan Municipality*, 2018.