

SPATIAL DATA FOR LAND USE PLANNING IN NEPAL

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Key words:

ABSTRACT

Land use planning is the process of assigning land for agriculture, forestry, settlement/urban uses, grazing and other uses and using accordingly to implement national programmes of solving problem of food security and environment and implementation of international conventions like UN Framework Convention on Climate Change, Agenda 21. Spatial data are required to plan at national and lower levels and to implement the assigned the land use categories by cadastral parcels. Before launching Land Use Planning Programme, appropriate legal system and administrative infrastructures required to be arranged which are partially arranged in Nepal. Spatial data for planning at national and district levels may be topographical, land utilisation, land system (land form and soils), geological, climatological, land capability, other infrastructural data and various master plans collected to form maps at the scale of 1:25,000 - 1:50,000 and converted into digital form. The spatial database for implementation at village level, may be large-scale topographical, soil, cadastral and infrastructure maps and data collected in digital form. Spatial data may be updated using latest aerial photography and satellite imagery of appropriate resolution with field verification.

1. INTRODUCTION

Land is the important property and economic resources where all the development activities are concentrated. Therefore, it is required to carry out long term and scientific land use planning and to implement for the balanced, multi-dimensional and sustainable development of the country on the basis of physical features, composition, quality and capability of the land.

The country population is increasing 2.2 percent per annum and forestland is encroached 0.5 percent per annum. The food production could not be increased and food-exporting country in past few years back is become food-importing country. The unplanned and uncontrolled expansion of urban areas in agricultural land depleted agricultural land, increased pollution, had negative impact on productivity and effected traditional system of sustainable land use practice.

The country has to support the pressure of ever growing population perpetually, to improve the living standard and provide the economic benefit to its people on the limited land /territory available. In this context, HMG of Nepal approved National Land Use Planning Programme of classification of land for agricultural, forestry, grazing, settlement, and other uses and using the land as per the planning.

A project office is established on July, 2000 and conducted the programmes of development of modals and norms of planning and prepared the spatial data base for planning of one district and two village development committees (VDC), the lowest unit of administration. It is also working to draft legislation, to fix modals and norms of planning and implementation of land use plans and to establish monitoring and evaluation arrangements at centre to VDC levels.

2. PRESENT SITUATION

Nepal has 147,181-sq. km. of territory (0.1percent of total landmass of world) out which 20.7 percent is arable. The Nepal population is 23.4 millions and increasing 2.2 percent per annum and 15 percent of them are living in urban areas. The half of the population will live in cities in 20-25 years time and the city areas will grow in good agricultural land unless intervened by planning process.

Nepal is special by it physical settings, diversity of plants, wild lives and domestic animals and culture of terrai, hill and mountain areas. It has over 7,000 varieties of plant studied out of which 700 medical herbs, 200 mammals, 900 fishes and 600 butterflies. 18 national parks, buffer zones and wild life sanctuaries cover the 27,728-sq. km. (18.8 percent) of territory. It also has over 2,150 culture heritage sites all the countries. All kinds of mineral resources from coal to uranium are discovered and industries like gems, cement and various construction materials are being established. The emphasis is given to conserve resources and develop non-perishable resources like hydro-electricity, agricultural, forestry, and tourism.

Nepal also has 22,500 sq. km. snow covered areas with seven mountain ranges over 8000 m high and 18 percent of rain received in this region, turns into snow. It has 80 glaciers, 17 alpine lakes, 40 other lakes, 11 hot springs and over 6000 rivers and streams pour 174 bilious cu. m. /sec. of water in India

The prosperity of Nepal lies on proper development and conservation of its natural and cultural resources. Without proper land use planning, scientific and sustainable development and conservation of these resources will be impossible.

UN conventions: Nepal participated actively various international conferences on conservation of natural resources since 1960s. Nepal is also the signatory of Geneva Convention 1975, CITES conversion of 1973, UN convention Bio-diversity 1992, UN Framework Convention on Climate Change and participated Rio conference and signed the various documents. The various national acts and regulations enacted and promulgated to cater the national needs and to implement these endorsed conventions.

The cadastral survey of agricultural areas of Nepal was completed in 1997 after 33 years of laborious field survey work and resurveyed started in 1997. Land Resources Mapping of Nepal was completed in 1986 and new topographic maps at the scale of 1: 25,000 and 1: 50,000 will be completed by December 2001. National Geographic Information Infrastructure development work started in 2001.

Various organisations are planning to establish their GIS for planning and implementation of their plans and programmes. Each district office produces and updates the District Settlement Inventory of the respective district. The Nepals' neighbours are capable to acquire remote sensing data of the regions at reasonable resolutions. Various master plans like transport, agriculture, forestry, health, education are prepared at national and regional (SAARC) levels.

HMG Nepal approved the Land Use Planning Project in Feb. 2000, after study conducted by Tribhuvan University and discussion at workshop organised by Min. of Land Reform and Management. The Ministry is also conducting the programme of preparation of legal base, spatial data and methods of implementation of such programmes.

3. OBJECTIVES

The Land Use Planning Project was established to achieve the objectives of self-sufficiency on food production, improvement of environment and sustainable development of the country. To achieve the above objectives the following programmes are required to produce spatial databases for planning: -

1. To classify the land for the use of agriculture, forestry, grazing, settlement, industrial and other uses,
2. To classify further the agricultural land for most productive crops as per the geographical speciality, land capability and soil quality of land,
3. To classify the land of the 58 municipalities for land use planning to conserve the water, forest and bio-diversity and
4. To identify and plan environmentally the transitional major settlements of Nepal.

4. PROGRAMS AND PROCEDURES

As Land Use Planning, has long term effects on food production, environmental situation and sustainability of the country, it is required to address by the provision of approve legal base as well as establishment of co-ordinating, implementing and monitoring mechanism at central, local and stake holders' levels. It is planned to implement the programme in the following procedures

4.1 Establishment of co-ordinating, monitoring and implementing Mechanism

To implement the land use planning programme, HMG/Nepal decided to form the **Central Land Use Co-ordination Council, Land Use Programme Committee** and **Central Land Use Project** at the central level and **District Level Land Use Action Committee**, on July 24. 2000. The Project will prepare the Land Use Plan of each VDC and Municipality with concerned VDC office /Municipality along with District Land Use Plan with the co-operation and co-ordination of concerned District Level Land Use Action Committee.

4.2. Legal Aspect

Traditionally good irrigable land was strictly used in agriculture purposes, slopping terraces for dry land farming and settlements, lesser quality land, sloping land to forestry and grazing purposes. Hence, land use zoning was rice field, dry land farms and settlement, grazing area for cattle, forestry near the villages and the land for other and common uses. The settlement was then in high ground on dry land. On last four decades forest was cleared for agriculture and vast tract of good agricultural land converted into urban settlements.

Where ever good transport facilities are available, heavy settlement are being developed on most of flat land or good arable land and sooner all these arable area will be converted to urban slums which will reduce significantly the good agricultural land, degrade environment and be difficult to develop healthy urban centres.

Hence, Act related to Land, 2021, Land (Survey) Act 2019 and other Acts will be amended to restrict on conversion of the land for other uses without land use planning and to assign land use category to each land parcel on the basis of cadastral records. Accordingly, Land Ownership Certificates and Registers will be amended.

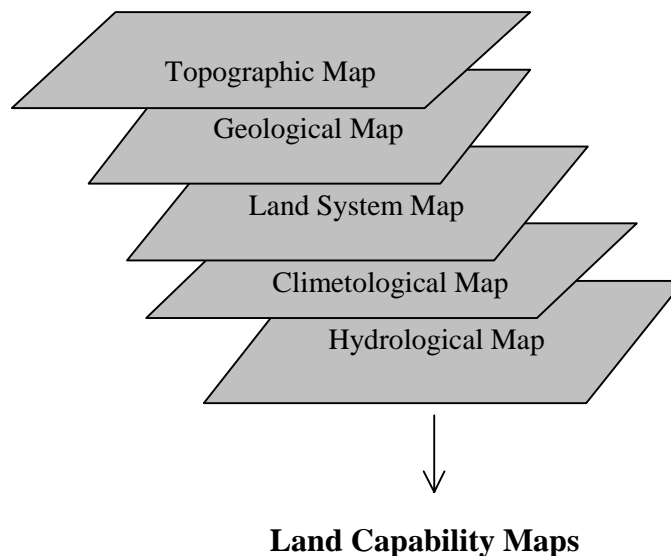
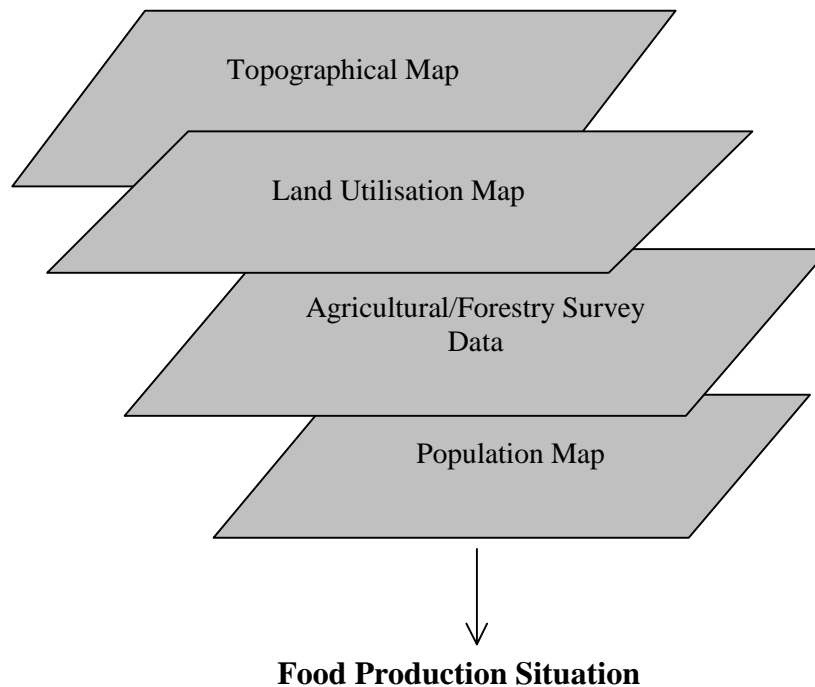
4.3 Technical aspects of land Use Planning

Food security, improvement of environment and sustainable development are main objectives of Land Use Zoning. It is required to establish GIS to address these programmes which may be summaries as following: -

1. To convert the spatial and attribute data into digital form, which are uniformly structured into one system. The spatial data will be based on topographical and/ thematic information,
2. To evaluate existing maps and data for accuracy and completeness and to revise or update these digital data using remote sensing or digital photogrammetric technique, field surveys and other appropriate methods,
3. To develop capability maps, norms arrange legal bases and prepare land use zoning of the areas for agricultural, forest, grazing, settlement and other uses. The team of experts using GIS tools will conduct this work. The zoning will be based on land capability, present land use, will and wishes of the people and long term requirements of the country.
4. To develop macro and district levels Land Use Planning maps and data systematically,
5. To develop the VDC and Municipality level Land Use Plan, transfer the land use classification on cadastral plans and record and amend/ update the Land Ownership Certificate and Records
6. To notify the land use planning on the national gazetteer and assist the owners to use the land as per plan after formal approval from local and central authorities. The conversion to other uses will only be allowed by planning process.

4.3.1 Tentative method of achieving the goals

Food Security

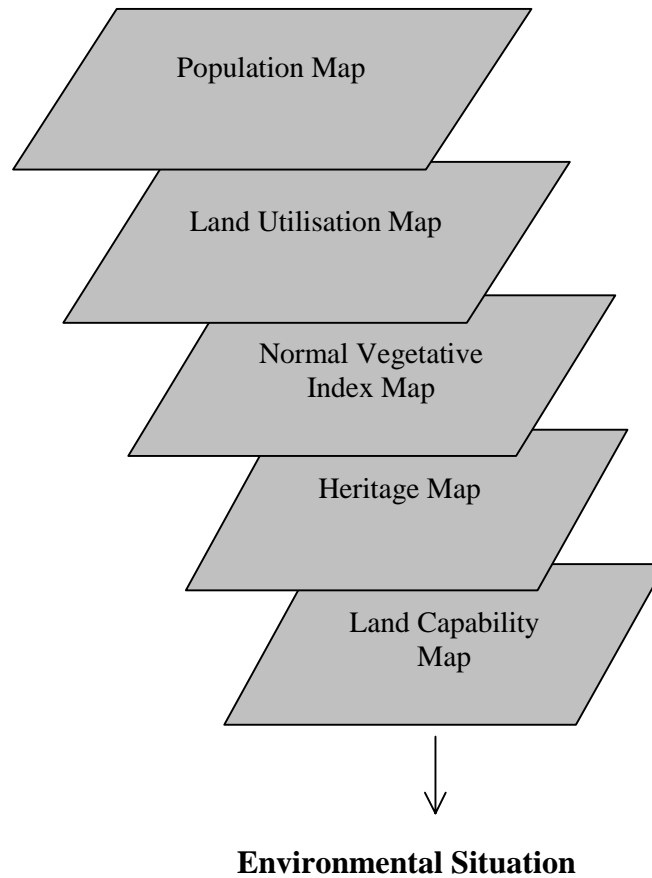


The present land utilisation maps and agricultural and forestry data will provide the present situation of production of food grains, timber and firewood and grass/fodder of Nepal.

The population census, and other census data and their projections will provide the present and future requirement of food. The capability maps, food requirement, and the soil quality

information will provide the estimated information on the amount of food may be produced and the input required.

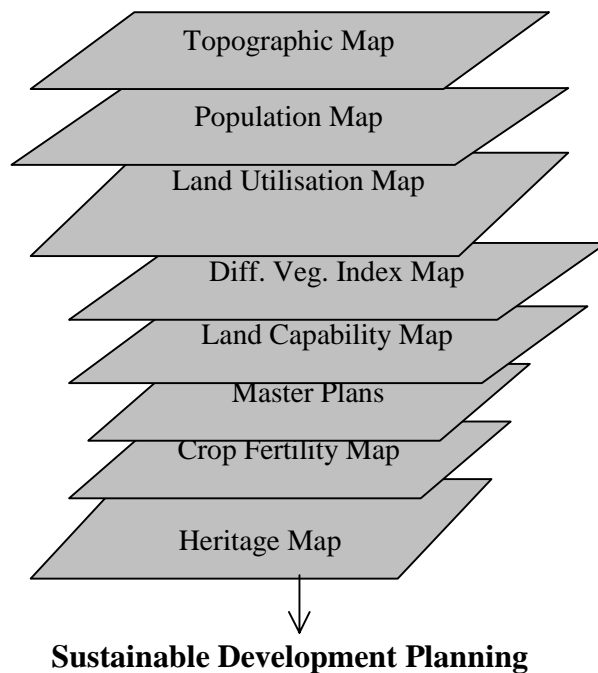
Environmental Improvement



The national parks, wild life sanctuary and other protected areas will be preserved and new areas, if necessary, will be assigned to conserve natural and cultural heritages. To improve the quality of air, water and soil, the necessary forest coverage will be maintained. Tree / horticulture plantation will be maintained to reduce the CO₂ production, fuel or timber material production, erosion control and other purpose.

Present Land Utilisation, Land Capability and Heritage Maps and data, and normal vegetative index from satellite imageries will be utilised to assess the environmental situation and forest cover areas. The land capability information and master plans will assist to decide the amount of forest cover areas required for environmental improvement.

Sustainable Development



The sustainable development / or best use of the land will be carried out by assigning the land use zones on the basis of capability, use of proper technology, measures to protect from erosion and maintenance of soil fertility and improvement of air and water quality.

The land suitability maps and information will be developed from soil, slope, climate, available water resource, and land utilisation data and related plans. The researches and pilot studies data of various land uses and crops will be utilised to assess the sustainability of the production.

4.3.2 Data requirement

Maps and data are required to assess the present natural resources available (land utilisation, land system, geology, water resources, climate and topography), land capability (soil, topography, climate, infrastructure and technology), vegetation (land utilisation, satellite imagery/ aerial photographs) and environmental other situations like cultural and natural heritages, natural and man made calamities. Settlement Service Inventory is also available in local Offices. Some field works to collect additional data and views of stakeholders are always required. During that period, additional data are collected and plans are finalised.

The master plans, norms, research findings are useful to develop norms of planning. These norms are required to translate into spatial data analysis.

4.3.3 Treatment of Maps and data

All maps and data are required to convert in spatial digital form in one projection, system, and uniform scales, if possible one scale. The topographical maps / data are used as base data for conversion to a uniform format. The quality of the data and the conversion to digital form must be appropriate to the spatial analysis. The quality of data must be checked and assess in each phases of data acquisition and conversion.

The digital maps and data must be updated or revised by the method of remote sensing or photogrammetry or field survey method as per the changes occurred. The additional required data is collected using any one two of these methods during the meeting of stakeholders.

4.3.4 Development of National GIS or District GIS planning data.

The GIS at national level or macro-level be established using spatial (topographic and thematic map) data, population data, and other maps and data. The National Geographical Information Infrastructure Project established in July 2001.

The appropriate softwares be developed or procured to establish GIS, process, check and analysis of data.

Models and norms are developed for each land use class with options of each of the 5 physiographic regions. Such as subtropical land of humid area (annual rainfall 2000- 3000 mm) situated in the terrai region with soil more than 1 m thick, slope less than 1 degree and water table 2-3 m deep is classified as agricultural or class 1 land.

On the basis of models and norms, all the land of the country classified and total areas of each land use class are decided and models and norms are finalised. The land use plan of each VDC / Municipality is prepared on the basis of the model/norms, at 2-5m resolution or at scale of 1:5,000 – 1: 10,000.

The plans are finalised after discussion with stakeholders and accommodating the deficiencies of the plan and local views. Information of the plan will be transferred to LIS spatial data or Cadastral plan.

4.3.5 Relation with LIS data and land use Planning Data

Large scale maps or high resolution GIS is required to prepare the land use plans of VDC / Municipality. It may be transferred to cadastral plan or LIS spatial data. The land use class of each parcel is determined and published.

In Nepal, cadastral records like land classification, land use information may be used to relate land use planning information.

5. IMPLEMENTATION

After approval of the plans by concerned authorities and enactment of legislation, the planning information be published and communicated to all stakeholders by the available means of communication.

The land Ownership Certificates and Registers be updated. The land use classification of parcels be known to all owners where surveyors may be called to identify the land Use classes and inform to the owners. Surveyors identify data by transferring the plan data to spatial cadastral data or relating the land use plan data to the cadastral land class and land use data.

6. CONCLUSION

It is tremendous tasks of land use planning of the whole country consisting of 3913 VDCs and 58 Municipalities. However, it will also have long term positive impact on environment, sustainable development and alleviation of poverty of developing countries. It is expected that the co-operation of all the concerned agencies and exports will be required to complete the work in time and the assistance of the donor agencies will also be needed to accomplishes these tasks successfully in a reasonably acceptable time period.

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BIOGRAPHICAL NOTES

Mr. Punya Prasad Oli is presently working as Joint Secretary, at Min. of Land Reform and Management, HMG Nepal; previously worked as survey officer, Assistant Director, Deputy Director General and Director General of Survey Department, HMG Nepal; and has B.Sc, and Diploma in Land Surveying (UK) academic education and training on surveying and mapping, management of national LIS, mapping and surveying agencies and senior executive. Member of Surveyors' Society of Nepal, Remote Sensing and Photogrammetry society of Nepal and other organisations.

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