STUDY OF OPTIMUM FOREST AREA FOR LUMBINI PROVINCE TO BALANCE DEVELOPMENT AND ENVIRONMENT

(लुम्बिनी प्रदेशमा विकास र वातावरणबीच सन्तुलन हुने अनुकुलतम वन क्षेत्रफल सम्बन्धी अध्ययन)

Terms of Reference

Province Planning Commission

Lumbini Province, Butwal, Nepal

2077 Falgun

Terms of reference (ToR) for the study of optimum forest area for Lumbini province to balance development and environment

1. INTRODUCTION

Forests covered four-fifths of the earth's area at the beginning of the Eighteenth century; it decreased to 30% by the mid-Nineteenth century, and further decreased to 24.4% by 1990 (THC1/iwggf, 1994). While forests are influenced by climate, landform and soil composition, anthropogenic activities associated with economic development was the primary reason for this alarming reduction in the global forest cover. Scenarios like this were the reasons behind the organization of the United Nations Conference on Environment and Development (UNCED) [also called the Earth Summit].

The 1992 Earth Summit held in Rio de Janeiro, Brazil proposed an action plan called Agenda 21, which later became the basis of the seventeen Sustainable Development Goals (SDGs) set for 2030. Agenda 21 highlighted the necessity for all countries to develop harmonized approaches in the management, conservation and sustainable development of global forests to meet the socio-economic and environmental needs of the present and future generations. The agenda further emphasizes the conservation and sustainable utilization of biological diversity. SDG 15 is about the protection, restoration and promotion of sustainable use of terrestrial ecosystems and sustainable management of forests. SDG 13 suggests taking urgent action to combat climate change and its impacts. It aims to halve the base year's CO_2 emission level. Forests are effective to absorb CO_2 and hence, this goal also implies for the conservation of forests. In the post-Earth Summit era, forest cover and tree cover has gained public attention and some signs of improvements are observed in many parts of the world; particularly the rate of deforestation has decreased over the past three decades (fao.org). Nevertheless, conservation of forests and gain in tree cover are quite challenging.

Forest conservation has been an important agenda in Nepal since long. The regulations are regarded as challenges by the people working for development. Project managers of many construction projects often blame that forest clearance is one of the most critical factors for the delay of the projects. Irrespective of the scale of deforestation and urgency of the project, each and every project has to get an approval from the Nepal government cabinet for cutting even a single tree. The process is quite lengthy and goes for years. For instance, Dang section of the Postal road project, a national pride project, in Lumbini province is waiting for the forest clearance for 3 years and it is not known yet when the clearance will be received. It is widely realized that rules are not only harsh but also irrelevant in many aspects.

Another policy issue commonly encountered in Lumbini province is that of open area within forest boundaries. Open plots of land available as forest lands appear as

suitable area for public infrastructure development including hospitals and stadiums. Many of these areas do not have tree cover and have been lacking any plan of plantation since long but when it comes to infrastructure planning, getting permission to use the land is often complicated because the land is treated as forest land. If differential treatment of open areas and dense forests is practiced, it may encourage in selectively utilizing open land for infrastructure development, and consequently safeguard dense forests.

Many limestone mines are operational in Lumbini province and they must have contributed towards deforestation even though the rule of compensation plantation such as 1:25 and 1:10 do prevail. Out of 61 cement factories in the nation, 46 are in Lumbini province and the province contributes an estimated 75% of the national cement production. While mines are means of prosperity, cement factories require large hills as their quarries. Many hills have been already licensed and quarrying of them in future may cause forest loss. Quarrying of hills is also envisioned for construction materials and also for disaster reduction, such as by the Siddhababa hill trimming project being undertaken by the province. A clear picture of forest cover will guide the policies for quarries and mines.

Lately, track opening for roads and land development for playground has been quite extensive at the local levels of Lumbini province. This trend of development without proper engineering design is colloquially called Dojare Vikas to refer to the development relying on an excavator (dozer). Such development has caused serious environmental problems including deforestation, soil erosion, landslides and air pollution. These days, not only the urban areas but also the hilly areas have suffered from air pollution. However, to avoid the harsh and lengthy legal procedures, projects are sometimes heard of encouraging illegitimate practices for opening tracks and clearing construction sites. This attitude must be stopped and it will be possible only by properly addressing the development needs and public aspirations. The aspect of forest conservation should acknowledge other goals of sustainable development too.

Out of the 17 goals, the SDGs also emphasize the building of resilient infrastructure and promotion of inclusive and sustainable industrialization (SDG 9). SDG 8 emphasizes to promote economic growth and productive employment. Economic growth, infrastructure construction and industrialization require cutting of trees at certain places. Infrastructure such as roads, airports, and urban facilities often require large scale tree cutting. SDG 10 asks to reduce inequality within and among countries. This suggests that many of the benefits and opportunities available in the developed countries should also be made available in the developing countries. Despite conscious efforts on conservation, the transformation of countries from the “developing” to “developed” stage will incur not only the monetary cost but also the environmental cost.

SDG 7 is about ensuring access to affordable, reliable, sustainable and modern energy for all. The world is moving from the fossil fuel sources of energy towards renewable energy sources including hydropower, solar and wind energies. Construction of such energy facilities will also require some deforestation in the construction areas. Even to ensure the availability of water and sanitation for all as stipulated in SDG 6,

reservoirs, tanks, large treatment facilities, and extensive pipe networks should be constructed. Often, the source of water is within or besides forest areas and hence these structures also warrant for cutting of trees in the construction areas.

Goals such as ending poverty (SDG 1), ending hunger (SDG 2), ensuring healthy lives (SDG 3) and ensuring quality education (SDG 4) also involve many construction and land development activities. Forests cannot remain untouched except for the protected areas. Moreover, Nepal has a forest cover in excess of 40%, many people have their livelihood connected to forests, and hence for Nepal, SDG 8, 12 and 15 infer that forest resources should be sustainably utilized for achieving economic growth and prosperity.

Forest cover and tree cover is basically a function of cover loss and cover gain (fao.org). Infrastructure construction, settlement and expansion of agricultural land have caused loss in forest cover, particularly in Terai and urban region. However, hilly villages have a different scenario. Gulmi, Arghakhanchi and Palpa districts of Lumbini province experienced negative population growth as per the 2068 census. With a declining population and also the changes in their lifestyles (reduced use of firewood and less demand of fodder for cattle), many agricultural plots in those villages are now converted into jungles even though the land is not officially counted as forest area. While worrying about the loss in forest cover in Terai and urban areas, this gain in tree cover has not been properly acknowledged. A new system has to be devised and practiced to account for the gain in tree cover in private lands.

Moreover, many people and people's representative often complain that monkey population has significantly increased due to increased tree cover and has been a major driver for forced emigration from hills. Public consultations performed during preparing the first periodic plan of Lumbini province revealed that monkey has been one of the key problems for villagers in the hilly region. This is a pity situation and should be solved in a systematic way. The periodic plan therefore outlines a program to mitigate the monkey problem but a concrete action is yet to be formulated. This problem associated with monkeys deserves recommendations from scientific studies.

As per the Forest cover map of Nepal published by the Department of Forest Research and Survey under the Ministry of Forest and Soil Conservation in 2014 AD, the forest cover area of Nepal is 44.74% and that of Lumbini province is 50.43%. The newly formed jungles in private lands as mentioned in previous paragraphs are probably not counted in this official record of forest cover. Therefore, it should be revisited that what should be the target forest coverage in Lumbini province. The province, through its ministry of industry, tourism, forests and environment is working for forest conservation. However, what should be set as the target forest cover by the ministry and what should be the basis of measuring the performance of forest conservation?

Trees are renewable natural resources and many countries including Canada and Malaysia have successfully utilized their forest resources in a sustainable manner to serve as a major contributor towards their national economy. It is now being increasingly realized that sustainable production of wood through environmentally sound selective harvesting practices is one of the most effective ways in ensuring *in-*

situ conservation of the biological diversity of forest ecosystems (THC1/iwggf, 1994). Nepal was adopting scientific forest management for some time before it was halted by the cabinet decision in 2020 May 28, and finally dismissed in 2021 January. The cabinet decision is widely regarded by forest related professionals and researchers as lacking rationality. This issue deserves extensive scientific research. Timber lumbers are seen decaying here and there in Lumbini province. The government of Lumbini Province aims to take advantage of forest resources from its more than 50% forest coverage area and is looking for ways to have a significant weightage of forests occupying more than half of its territory on the GDP of the province. Since conservation is largely regarded as a "don't touch" approach, the fear of touching the forest resources will be reduced when we know the optimum forest cover area for the province.

Forest conservation and development needs are often seen as two conflicting agendas. However, both are essential and hence should be promoted in harmony. The crux of the problem lies in treating the two agendas separately, and accordingly, the solution lies in addressing the two agendas as a system perspective. Forest conservation asks to increase the forest coverage area and development activities ask for forest clearance, hence, optimum forest coverage should first be defined.

2. OBJECTIVES OF THE STUDY

The objective of the project is to conduct a scientific research to propose the optimum forest coverage percentage for Lumbini province by seeking a balance between the environment conservation and the aspirations for development and prosperity in line with the SDGs.

3. MAIN TASKS AND SCOPE

This study project aims for an authoritative scientific research in a controversial policy issue to be dealt by the province. National policies and regulations should be critically reviewed based on national needs and international practices. The research should be conducted by research authorities in the relevant field and by following standard scientific research practices. The findings should be aimed for publication in SCI indexed scientific journals.

As the study will be performed by experts in the field, the methodology and scope of work should be ascertained by the researchers to solve the problems raised in the background section and to accomplish the objective of the study project. In addition to the methods and tasks identified by the researchers, the following tasks should be performed to accomplish the objective of this study.

1. Identify the forest coverage area in Lumbini province. Devise ways to estimate the number of trees in various types of forests, in private lands and in settlement areas and estimate the number of trees in the province.

2. Study the historic trend of forest coverage in the province and project it for the near future based on the most likelihood rates.
3. Review the forest coverage area in various parts of the world and analyze it in the perspective of Lumbini province.
4. Review the concept and practices of "optimum forest content" in various parts of the world and analyze it in the perspective of Lumbini province.
5. Review the economic growth and development models of other countries and analyze it in the perspective of Lumbini province.
6. Project the development needs and aspirations of the people of Lumbini province in line with SDGs and beyond 2030.
7. Review the construction practices and development activities in other countries and recommend the suitable policy guidelines for the province.
8. Review and analyze the forest conservation strategies abroad and recommend suitable policy guidelines for the province based on a system perspective with the development needs and aspirations.
9. Recommend key performance indicators and targets for the province towards forest conservation for the short, medium and long terms.
10. Review global practices on the sustainable utilization of forest resources and recommend policy guidelines to the province for best utilizing its forest resources in a sustainable manner for the prosperity of the province.
11. Come up with an optimum forest coverage area for the province by seeking a balance and harmony between forest conservation and development needs. An alternative approach could be to propose an optimum number of trees in the province as the distribution of trees will be changed with development activities. Moreover, while a single figure of "optimum content" is required, it may be composed of various sub figures considering types, forest categories, distribution, duration and conditions.

4. STUDY DURATION

As an annual program of the provincial government, the proposed study should be completed within fiscal year 2077/78.

5. HUMAN RESOURCES

A minimum of following expertise and equivalent person-month should be actively utilized in the proposed study. Collaboration among researchers from different fields is anticipated. The consultant should also manage additional support staff as required.

SN	Expertise/profession	Human-month
Research personnel		
1	Forest expert and team leader	2
2	Infrastructure development expert	2
3	Economist	2
Professional personnel		
4	Environment Officer	3

5	Civil Engineer	2
6	Surveyor/ field technician	3

5.1 Key qualifications

1. Forest expert and team leader

The person should be an authority in the field of forestry in Nepal as demonstrated by the academic qualification, position, experience and research publication records.

Education: Minimum PhD in relevant subject.

Current position: Should be presently holding a top or upper level managerial position in a firm or research institute or should be at least an assistant professor in an academic institution.

Experience: Should have a minimum of 5 years full-time work experience related to forestry and environment.

Publication: Should have published at least 5 research articles in SCI indexed top tier journals and the "**i10"** research index of the person should not be less than 5 (as measured by Google Scholar or equivalent). Fulfillment of this requirement should be clearly demonstrated in the proposal.

2. Infrastructure development expert

The person should be an authority in the field of infrastructure development as demonstrated by the academic qualification, position, experience and research publication records.

Education: Minimum PhD in civil engineering, urban planning or relevant subject.

Current position: Should be presently holding a top or upper level managerial position in a firm or research institute or should be at least an assistant professor in an academic institution.

Experience: Should have a minimum of 5 years full-time work experience related to infrastructure planning and development.

Publication: Should have published at least 5 research articles in SCI indexed top tier journals and the "**i10"** research index of the person should not be less than 5 (as measured by Google Scholar or equivalent). Fulfillment of this requirement should be clearly demonstrated in the proposal.

3. Economist

The person should be an authority in the field of economics as demonstrated by the academic qualification, position, experience and research publication records.

Education: Minimum PhD in economics or equivalent.

Current position: Should be presently holding a top or upper level managerial position in a firm or research institute or should be at least an assistant professor in an academic institution.

Experience: Should have a minimum of 5 years full-time work experience related to economic analysis.

Publication: Should have published at least 5 research articles in SCI indexed top tier journals and the "**i10"** research index of the person should not be less than 5 (as measured by Google Scholar or equivalent). Fulfillment of this requirement should be clearly demonstrated in the proposal.

4. Environment officer

Education and experience: Minimum Bachelors in Forestry or Environmental Engineering with 5 years' work experience or Master's in similar subject with 2 years' experience.

5. Civil engineer

Education and experience: Minimum BE with 5 years' work experience or ME with 2 years' experience.

6. Surveyor/ field technician

Education and experience: Minimum intermediate level technical education with 5 years' work experience. A minimum of one technician with engineering survey background and one technician with forestry background shall be proposed.

6. SHORT LISTING AND EVALUATION CRITERIA

The study project will be awarded on a quality and cost consulting service. The evaluation will be based on 90% weightage for technical proposal marking and 10% weightage for financial proposal marking.

At the first stage, shortlisted applicants will be evaluated for technical proposal. Only those successful in the technical evaluation will be marked for financial proposal.

Stage 1 marking

For the technical proposal marking, the following criteria will be used. Proposals will be marked initially for a full mark of 100, which will be converted to the weightage of 90%.

A. Related work experience (20 marks)

Work performed within last 4 fiscal years and the running fiscal year are counted. In case of private company, work accomplished by the company and in case of an academic institution, work accomplished by the department, faculty or unit (lowest formal division) of the three research personnel. For the purpose of this criteria, each work should be a study project with a budget of at least 10 lakhs NPR or equivalent.

1. Work related to the forestry (per work 5 marks with maximum of 10 marks)
2. Work related to infrastructure planning and development (per work 2.5 marks with maximum of 5 marks)

3. Work related to national or international level economic analysis (per work 2.5 marks with maximum of 5 marks)

B. Methodology and relevancy to the scope of work (30 marks)

This is a scientific research project and the intellectual caliber should be evaluated. Therefore, methodology and relevancy will be examined and evaluated by an evaluation committee specifically formed for evaluating this project. The three members will represent forestry sector, infrastructure development (engineering) sector and economics sector and will have doctorate in respective fields. The committee will be composed of two academicians with Google Scholar's h-index and i10-index being greater than 10 and one professional having more than 15 years of experience in the forestry and environment sector. The committee will evaluate the proposals and provide the mark for this part.

C. Qualification and experience of key personnel (50 marks)
    1. Team leader (20 marks)
        a. Experience (10 marks)
           From 5 to 10 years' fulltime experience, mark equals the whole number of years of relevant experience and above 10 years' experience gets the full mark of 10.
        b. Publication (10 marks)
           From i10 index 5 to 15, mark equals the i10 index minus 5 and for the i10 index above 15, get the full mark of 10.
    2. Infrastructure development expert (15 marks)
        a. Experience (10 marks)
           From 5 to 10 years' fulltime experience, mark equals the whole number of years of relevant experience and above 10 years' experience gets the full mark of 10.
        b. Publication (5 marks)
           From i10 index 5 to 10, mark equals the i10 index minus 5 and for the i10 index above 10, get the full mark of 5.
    3. Economist (15 marks)
        a. Experience (10 marks)
           From 5 to 10 years' fulltime experience, mark equals the whole number of years of relevant experience and above 10 years' experience gets the full mark of 10.
        b. Publication (5 marks)
           From i10 index 5 to 10, mark equals the i10 index minus 5 and for the i10 index above 10, get the full mark of 5.

Stage 2 marking

For the financial marking with 10% weightage, only the proposals that pass the technical evaluation will be considered. Among them, the proposal with the lowest

quotation will be given full marks. For others, the mark obtained will be equal to the full mark multiplied by the ratio of the quoted price to the minimum quoted price.

Final marking

The final mark will be the sum of the marks from the first and the second stage marking and the one receiving the highest mark will be awarded the job.

7. DELIVERABLES/ EXPECTED OUTPUT

The consultant shall submit/accomplish the following as deliverables:

1. An interim report after conducting a desk study and the first phase of field investigation
2. A progress presentation incorporating the contents of the interim report
3. A draft final report expecting comments from the PPC
4. A draft final report presentation incorporating the contents of the draft final report
5. A final report incorporating the comments on the draft final report and its presentation

Each report and presentation should be submitted in 3 copies in print and an editable soft copy. Any further reports, documents or programs developed or generated during the course of study should also be submitted in a functional and editable format.

The researchers are encouraged to publish the research findings in renowned international journals. However, any intellectual property rights generated due to this study will remain within PPC.

8. MODE OF PAYMENT

The payments shall be made in three installments. Each installment shall be paid only when the required reports are submitted and accepted by Province Planning Commission (PPC). In each report, the contents, formats and copies to be submitted should be strictly maintained as mentioned above. The details of time period for various report submission, payment amount, and the report to be submitted are shown in the following table.

No. of installment	Time period	Payment in % of total bid amount	Report to be submitted
First	Within 1st three weeks	25%	Inception report
Second	Within 2nd month	40%	Draft report
Third and Final	Within 3rd month	35%	Final report

9 BILL OF QUANTITY

The bill of quantity for the proposed research study is presented below. The applicant shall fill and submit this as part of the financial proposal. This is a lump sum contract and only the total quoted price will be considered for evaluation.

SN	Particulars	Quantity	Unit	Rate (NPR)	Price (NPR)
1	**Human resources cost**				
1.1	Forest expert and team leader	2	Month		
1.2	Infrastructure development expert	2	Month		
1.3	Economist	2	Month		
1.4	Environment Officer	3	Month		
1.5	Civil Engineer	2	Month		
1.6	Surveyor/ field technician	3	Month		
2	Travel and field related non-technical expenses	1	LS		
3	Field and lab expenses (technical)	1	LS		
4	Stationery, office related and miscellaneous expenses of the service provider	1	LS		
Total					