**B) A detailed research proposal**

**How to write a project proposal**

1. Step 1: Define the problem. ...
2. Step 2: Present your solution. ...
3. Step 3: Define your deliverables and success criteria. ...
4. Step 4: State your plan or approach. ...
5. Step 5: Outline your schedule and budget. ...
6. Step 6: Tie it all together. ...
7. Step 7: Edit/proofread your proposal.

**1. Title: Eradicating Prosopis Juliflora in Ramnad District: Ecological Restoration of Agricultural and Commercial Land**

**2. Introduction**

Trees are essential for the absorption of co2 from the earth's atmosphere and can help to reduce humankind's carbon emissions. Large trees may absorb huge quantities of carbon from the atmosphere each year, since they take carbon dioxide and release oxygen through respiration. As a result, trees and other landscape plants play a significant role in enhancing air quality. Trees absorb airborne pollutants that might otherwise harm the environment. The significant contribution of trees to the environment as well as sustenance of human life, is indisputable. Deforestation has been the major cause for global warming and other environmental hazards. Planting more trees has always been equated to protecting the environment, but there are few invasive plants which can harm the surrounding plants and affect the ecosystem. Restoring the land from such plants is also a part of protecting the environment.

The land has suffered greatly over the last several hundred years, owing mostly to modern farming techniques and urban expansion. Biodiversity loss and climate change has made us attempting to repair the land. So, selecting the right species such as native plants and removing invasive foreign plants can give the ecosystem a chance to regenerate.

Ecological restoration not only involves planting more trees but also eradicating invasive species of plants that cause harm to the ecosystem. There are some hyper accumulator plants which are capable of absorbing more water, minerals and nutrients from the soil. As they accumulate such high concentration of minerals and metals, they can be toxic to the plants near them. One such plant is Prosopis Juliflora, also known as Seemai Karuvelam in Tamilnadu, which has become a threat to vegetation as well as ground water. This species of plant is exotic to Tamilnadu, as there are speculations about its intentions of being brought to Tamilnadu as a firewood. It is a phreatophytic, perennial tree/shrub plant that belongs to the Fabaceae family and is a representative of the Sonoran Desert habitat. It is a thorny, perennial, large-crowned, and deep-rooted shrub or tree that may reach a height of around 10 m depending on the variety and climatic circumstances, and it has been proven to be the only foreign species capable of thriving in a wide range of soils and climatic conditions. Prosopis Juliflora has been included in the International Union for Conservation of Nature (IUCN) as one of the 100 worst invasive species.

The Times of India calls Prosopis Juliflora as “Silent botanical disaster engulfing India”. This plant was first introduced by the British to reforest the arid wastelands of western India. It is tough, drought-resistant, and native to Mexico. Due to the nature of the trees, it keeps spreading easily and quickly. It now controls over 500,000 hectares of the country's dry zones and has been at the centre of arguments about the ecological, social, and economic consequences of importing foreign plants into India. Its inherent growth potential is enormous. Its robust stem extends down to 15 metres to draw subsurface water from aquifers. It also depletes the moisture in the surface soil, preventing native plants from growing. This results in desert-like conditions. The plant will establish itself wherever its fruits travel. Though the British Raj first planted it in a small place, this is how it has spread over the NCT regions and certain states.

This plant species is like a paradox – it has multiple uses as well as adverse environmental threats. The features that make this species resilient are its deep roots and its ability to survive even in extreme environmental conditions. This exotic species was first introduced in the 19th century. Even after conducting various research and spreading awareness about the ecological threats, the Seemai Karuvelam trees still stand undefeated. From afar the colony of Seemai karuvelam trees look like evergreen canopy of trees, but in reality, they pose the greatest threat to the ecosystem. In 2017 this issue was taken to the highcourt. At first, the court asked Collectors and other Revenue Department officials in 13 districts under the Madurai Bench's geographical authority to eradicate Seemai Karuvelam trees on both public and private property. However, dissatisfied with the slow rate of progress, the bench directed that the work of officials be inspected by the respective chief judges and district judges. The Judges couldn’t come to decision because of the lack of scientific evidence on Prosopis Juliflora being the reason for depletion of underground water. After providing enough scientific evidence, the court has now granted permission to eradicate Seemai Karuvelam trees in Tamilnadu, passing a GO on July, 2022.

The need for this research project is to bridge the gap between planning and acting. With available data and resources, this project aims to implement the eradication of Seemai Karuvelam trees in the --- district. The previous literature serves as a base work for the selection of study site. The ground water level, growth of other native plants, pH, salinity of the soil, quality of agricultural land will also be taken into account while selecting the site for the research project. Seemai Karuvelam trees have the ability to spread wide and grow in colonies taking away the nutrients from the soil. Thus, in order to stop this invasion, eradication strategies, control management and prevention measurements will also be deviced.

**3. Objectives of the Study**

The following objectives are framed.

1. To identify the existing impact of Prosopis Juliflora trees on the surrounding ground water level.
2. To identify the negative effects of Prosopis Juliflora on the growth of native plant species.
3. To discover whether the farmers have adequate training and tools to eradicate Prosopis Juliflora trees grown around their farming land.
4. To find various ways to remove and dispose invasive Prosopis Juliflora colonies along the vegetative lands and water bodies.
5. To maximize the momentum of eco-restoration using cost and time effective methods.

**4. Conceptual Framework**

A tool (linked concepts) to help facilitate the understanding of the relationship among concepts or variables in relation to the real-world. Each concept is linked to frame the project in question

There are three sources for a conceptual framework: **(1) experience, (2) literature, and (3) theory**.

A conceptual framework is like a roadmap for your study, helping you visualise your research project and put it into action. It defines the relevant variables for your study and maps out how they might relate to each other

**5. Hypotheses**

The following hypotheses are framed and it has to be formulated and answered with practical assumptions.

1. The invasive growth of Prosopis Juliflora in the agricultural land destroys the nutrients of the soil thereby affecting the produce.
2. Eradicating and restoring the soil invaded with Prosopis Juliflora can improve the quality of the soil.
3. Equipping farmers with proper tools necessary for uprooting the Prosopis Juliflora trees can help its eradication easily.

**6. Review of Literature**

**At the International Level**

Wakshum Shiferaw identified that Prosopis Juliflora affects the salinity of the soil and also its pH. By testing the samples collected from Teru and Yalo districts in Ethiopia, the conclusion was made that the invasive Prosopis Juliflora colonies in these districts have changed the physicochemical properties of the soil. The clay content of the soil was also compared with the non-invaded soil sample and it was identified that invaded soil has 19.03% clay higher than the non-invaded soil. These changes in the properties of the soil makes it less suitable for agricultural practices.

Peter Felker in his study identifies Prosopis Juliflora as a weed. He also states that in low-income countries and countries below poverty line, such as Somalia, it is common to see Prosopis Juliflora being used as livestock food and firewood. He suggests various causes and mediation techniques for weed control in developing countries.

[Mahgoub Suliman](https://www.researchgate.net/profile/Mahgoub-Suliman) in his article “Understating Dilemma and Sophism of Prosopis juliflora Eradication in Sudan”, lists the number of reasons for unsuccessful eradication of mesquite plants. Through extensive literature survey, it was established that cost issues and scattered efforts could be the reason for various sectors (Government and private) being unsuccessful in eradicating such invasive species.

John Ilukar in his article investigates the ecological and socio-economic aspects of the invasion of Prosopis Juliflora in East Africa. He also suggested that with the increase in spread of P. Juliflora, there is a great suppression of the growth of native plants. The study also discovered that phosphorus and organic carbon in the soil were more than twice compared to the non-infested locations.

**At the National Level**

Dr.C.Paramasivan in his research article “Impacts Of Seemai Karuvelam (Prosopis Juliflora) Charcoal Heap Units In Ramanathapuram District Of Tamil Nadu” has addressed the need to eradicate Prosopis Juliflora to restore the deteriorating soil. He also underlines the socio-economic perspective of eradicating the colonies of Seemai Karuvelam. P. Juliflora is not only an environmental threat but also a resource for various poor families. From his study it can be understood that Seemai karuvelam charcoal heap units in Ramanathapuram District play a significant role in income generation, employment, utilization of local resources and convention of traditional knowledge in charcoal production.

“Biological invasion of the Seemai karuvelam (mesquite), Prosopis juliflora tree and its’ threat to the rainfed agro-ecosystems in southern Tamil Nadu, India: A case study” by [J. Sivanantha](https://www.researchgate.net/profile/J-Sivanantha), gives a detailed account on the history of Prosopis Juliflora in Tamilnadu. According to his study Seemai karuvelam (Prosopis juliflora) was introduced in Tamil Nadu in 1877 to ease fuel scarcity in the Ramanathapuram district. It was also introduced in the dry and semiarid districts of Tamil Nadu. It is a valuable source of wood for rural Indians. Although it was designed to enhance and meet the economic needs of the poor, it has generated major environmental difficulties. This paper highlights that the effects of P. juliflora on groundwater table reduction, cattle infertility and reduction of herbivore food for cattle. Even though this species has been infesting the soils for more than a century, there has been no proper solution for its control. This research article was published in 2021, even now the research says that there is currently no plan in place to control these weeds.

Maseesh Rahman in his article highlights the resilient nature of the P. Juliflora trees. Even when cut down they have the ability to grow back unless their deep roots are taken out. In order to eradicate this plant, the entire root which is 18 inches deep, has to be removed. The reason for unsuccessful eradication of Prosopis Juliflora is not removing the tree deep from its roots.

“Study on Ecological & Socio-economic impact of invasive species, Prosopis juliflora and Lantana camara, and their removal from forest, common and fallow land of Tamil Nadu” is a research project carried out by Dr. G.S. Rawat, Dr. K. Sivakumar, Dr. Ruchi Badola and Dr. B.S. Adhikari, during May 2017 to March 2019 under State Forest Research Institute, Government of Tamil Nadu. The aim of this project was to identify the population of Prosopis Juliflora trees in Tamilnadu. The results revealed that occupancy of Prosopis juliflora was more in the southern zone compared to the other two zones. Southern zone occupies 79.4% of Prosopis juliflora invaded in this region than western zone (46%), and in Cauvery delta zone (32%).

**7. Scope and Methodology**

**8. Relevance, Anticipated Outcomes and Proposed Outputs from the Research**

The relevance of this project can be traced back to the current need of restoring the land from invasive plants that proliferate and cause negative impacts in the habitats. The government has also showed its concern about the environment by approving a GO on eradicating Seemai Karuvelam trees in Tamilnadu. Previous studies have proved the environmental hazards caused by Prosopis Juliflora and also the distribution status among urban and rural areas in Tamilnadu. So, with this data set it is now possible to draft an action plan to remove,

The proposed output of this project can be divided into immediate and deferred outcomes. The removal of Prosopis Juliflora along the agricultural and trade land being the immediate outcome, the expansion of cultivable land being the deferred outcome.

**9. Tentative Chapterisation**

Chapter I Introduction

This chapter will introduce the problem and its challenges which were existing in CF methods and to understand about various CF algorithms have been used in the earlier projects.

Chapter II Review of Literature

This chapter to be consists of various reviews given by the researchers at international and national levels viewed about CF techniques towards the areas of CF.

Chapter III Methodology

The methodology chapter is to be divided into three phases.

* One directional Review using OBE

This feature is to be used to analyze the performance of library users based on the OBE with the support of various attributes.

* Bi- directional Review using OBE and Reader’s Forum

This bi-directional feature is used to review the features using OBE and readers forum by conducting some activities.

* Multidirectional Review using OBE,RF and LOP

This proposed feature is mainly used to combines the above two and added a new feature, to provide training to the novice users by practical demonstrations.

Chapter IV Results and Findings

The results chapter is used to combine the existing results based on the performance and time efficiency using some software metrics.

Chapter V Conclusion and Proposal of Future work

This chapter provides the details about to conclude the proposed activities and express about to enhance the current system for future studies.

Annexure

**10. Time Frame**

Phase I (duration First 1-3 months) –Problem Analyzing and Formulation

Phase II (duration 4-6 months) – Implementation of Work-1

Phase III (duration 7-9 months) - Implementation of Work-2 and Work-3

Phase IV (duration10-12 months)-Results and concluding activities

**11. Estimated Budget**

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| S.No | Broad Expenditure Heads | Value |
| 1 | Hired services: Software development and customization | 2,25,000 |
| 2 | Field Work: Survey/Data collection/Validation | 1,35,000 |
| 3 | Equipment   1. Computer (Software Development –OBE Library Assessment system for arts and Science college)   NVIDIA GeForce 940MX 2 GB Graphic card  Intel Core i5 Processor (7th Gen)  8 GB DDR4 RAM  64 bit Windows 10 Operating System  1 TB HDD  15.6 inch Display  ASP.net Software   1. Printer   Laser Printer Epson L-565 Inkjet All-in-One Color Photo Printer   1. Books | 60,000  10,000  20,000  10000 |
| 4 | Contingency | 30,000 |
| 5 | Publication | 10000 |
|  | Total | 5,00,000 |
| 6 | Institutional Overheads | 25,000 |

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