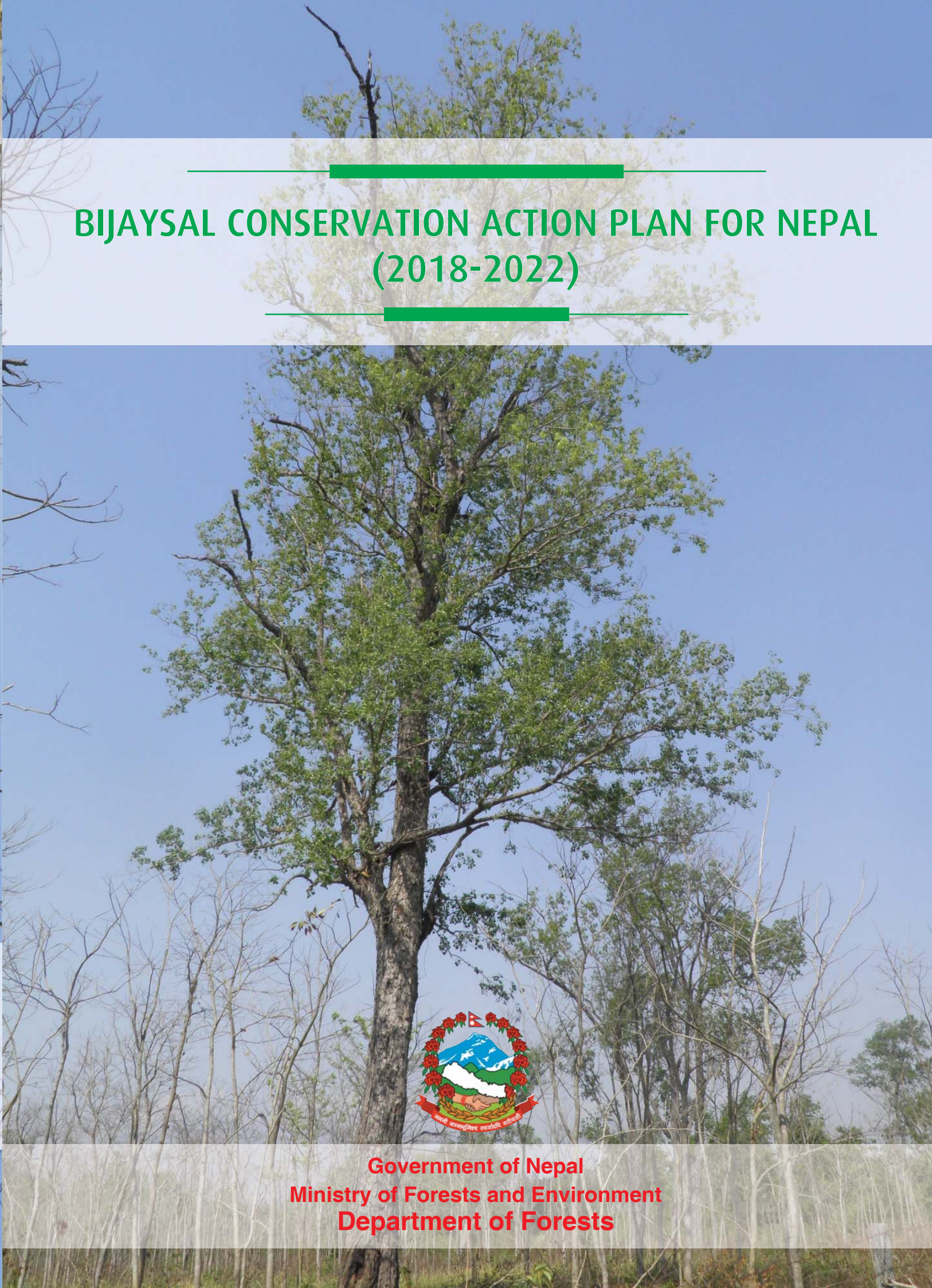
BIJAYSAL CONSERVATION ACTION PLAN FOR NEPAL (2018-2022)



Government of Nepal
Ministry of Forests and Environment
Department of Forests

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The Nepal National Biodiversity Strategy and Action Plan (NBSAP) 2014-2020 have prioritized the development and implementation of conservation plan for at least 20 species. Likewise, the Sustainable Development Goal (SDG) aims to prepare conservation plan for 30 species by 2030. This Conservation Action Plan for Bijaysal (*Pterocarpus marsupium* Roxb.) is the first species level floral action plan approved by the Department of Forests in accordance with NBSAP and SDG to fulfill Nepal's obligations to biodiversity conversation. Bijaysal has a limited distribution both at the national and global levels. Confined to an altitude of 100 to 500m, this species is naturally distributed at the foothills of Siwaliks in Kanchanpur, Kailali, Bardiya, Banke, Kapilbastu, Rupendehi and other districts of the country.

The Action Plan would not have been possible without the contributions of several institutions, experts and my colleagues at the Department of Forests. The team of experts Mr. Pashupati Nath Koirala, Project Coordinator- Adaptations for Smallholders in Hilly Areas (ASHA-MoFE), Mr. Dipesh Pyakurel, Botanist, and Mr. Ganesh Raj Acharya, Forest Management Expert deserves special thanks for conducting field studies, drafting and finalizing the action plan.

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I strongly believe that this conservation action plan will serve as a practical guiding document for the conservation and promotion of Bijaysal in Nepal.

Krishna Prasad Acharya

Director General

Acronyms and Abbreviations

AFO	Assistant Forest Officer
BZCF	Buffer Zone Community Forests
CBAPU	Community Based Anti-Poaching Unit
CBD	Convention on Biological Diversity
CBOs	Community Based Organizations
CDB-TU	Central Department of Botany, Tribhuvan University
CFs	Community Forests
CFCC	Community Forest Coordination Committee
CoFMC	Collaborative Forest Management Committee
CFUG	Community Forest User Group
CSO	Civil Society Organization
DADO	District Agricultural Development Office
DFO	District Forest Office/Officer
DFRS	Department of Forest Research and Survey
DLSO	District Livestock Service Office
DNPWC	Department of National Parks and Wildlife Conservation
DoF	Department of Forests
DoI	Department of Industries
DPR	Department of Plant Resources
FECOFUN	Federation of Community Forestry Users, Nepal
FGD	Focus Group Discussion
FO	Forest Offices
FUG	Forest User Group (including CFUGs, BZCFUGs)
GIZ	Deutsche Gessellschaft fur Internationale Zusammenarbeit
GoN	Government of Nepal
IUCN	International Union for Conservation of Nature
IoF	Institute of Forestry
LG	Local Government
MOFE	Ministry of Forests and Environment
NARC	National Agricultural Research Council
NRM	Natural Resource Management
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Governmental Organization
NTNC	National Trust for Nature Conservation
PS	Private Sector
SDG	Sustainable Development Goal
TISU	Tree Improvement and Silviculture Unit
USAID	United States Agency for International Development
WWF	World Wildlife Fund Inc.
ZSL	Zoological Society of London

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Executive Summary

Nepal's obligation to Convention on Biological Diversity includes the preparation of Nepal National Biodiversity Strategy and Action Plan (NBSAP) 2014-2020. One of the prioritized actions of NBSAP is to prepare and implement conservation action plans for priority species. The Bijaysal Conservation Action Plan is prepared by the Department of Forests to achieve the objectives set by NBSAP and is the first conservation action plan for plant species in Nepal. Confined to an altitude of 100m to 500m, Bijaysal (*Pterocarpus marsupium* Roxb.) has a limited global and national distribution. In Nepal, this species is naturally distributed at the foothills of Siwaliks in Kanchanpur, Kailali, Bardia, Banke, Kapilvastu, Rupandehi and Nawalparasi districts. A few trees have also been traced in Palpa and Arghakhachi districts. The major threats to this species include low germination and slow growth; high grazing pressure; extensive lopping for fodder; and over-harvesting of wood and extraction of *Kino* gum for economic purposes and medicinal use. Owing to these threats, this species is globally declining. For this reason, the Government of Nepal has imposed a ban on felling, transportation and export of Bijaysal. Also, this species falls under 'Near Threatened' category of the International Union for Conservation of Nature (IUCN) Red List.

Few *in-situ* conservation initiatives of Bijaysal in Nepal include gene pool conservation, population estimation in few districts, and establishment of seed orchard and geo-tagging of trees. While these activities are encouraging, the conservation of this species needs a holistic approach. This need eventually culminated in the preparation of the Bijaysal Conservation Action Plan 2018-2022. The plan preparation process involved an intensive review of conservation action plans for priority faunal species together with an extensive review of related literature, field studies to gather local-level information, consultations with experts, presentation of the draft report and collection of feedback, and finalization of the plan.

The goal of this plan is to increase the population of Bijaysal while its objective is to maintain a healthy population in natural habitats. The other objective is to promote *in-situ* and *ex-situ* conservation, and ensure sustainable use of this species in Nepal. The plan sets out following three specific strategies:

1. Enhance understanding and knowledge on Bijaysal and its status, distribution, propagation, ecology and habitat.
2. Increase the viable population of Bijaysal by 15% at the national level through the management of priority sites.
3. Strengthen multi-stakeholder participation for conservation of Bijaysal.

The budget required to implement this plan is estimated at around NRs 52.15 million (US$ 521,500) for a period of five years.

Chapter 1: The Context

1 Introduction

1.1. Relevance of the Action Plan

Government of Nepal (GoN) is committed to conserve and safeguard threatened and endangered flora and fauna. Biodiversity conservation, its sustainable use and equitable benefit sharing are the main objectives of Convention on Biological Diversity (CBD). The aim of the Convention is to address the adverse impacts on biological resources due to anthropogenic activities. The CBD envisions achieving its targets and objectives through Aichi Biodiversity Targets and Global Strategy for Plant Conservation. Nepal duly prepared the 'Nepal Biodiversity Strategy' in 2002 and 'Nepal National Biodiversity Strategy and Action Plan (NBSAP) 2014-2020' in 2014 (GoN 2014) in compliance with Article 6 of CBD. The NBSAP has identified several prioritized action plans for species level conservation, one of which being the 'development and implementation of conservation plans for at least 20 additional priority species as identified by MoFE (GoN/MOFSC 2014, pp 87). Likewise, the Sustainable Development Goal (SDG) aims to prepare conservation plan for 30 species by 2030 (GoN/NPC 2015, pp 25).

This floral action plan is the first species level action plan prepared by the Department of Forests (DoF), in compliance with NBSAP and SDG to fulfill Nepal's obligations to biodiversity conservation. The NBSAP 2014-2020 and Terai Arc Landscape Strategy and Action Plan 2015-2025 emphasized the importance of conservation of Bijaysal and stressed on the immediate need for strategic interventions to ensure its recovery and long-term survival.

1.2 Action Plan Development Process

The action plan preparation team collected and reviewed available secondary information pertaining to different aspects of Bijaysal conservation. The team also reviewed policies, strategies, reports, and other related national and international publications. Field consultations were done with District Forest Officers (DFOs), researchers and community forest users in six different Terai districts of Nepal where Bijaysal is reported. Literature review, data (primary and secondary) collection and extensive consultations were the three major steps adopted during the preparation of the conservation action plan. Moreover, several faunal conservation action plans (e.g. rhino, vulture) were intensively reviewed to prepare the first floral action plan. Likewise, journals, articles and books on Bijaysal were referred and they form the basis for context setting.

Primary data was collected through quantitative and qualitative questionnaires. Quantitative data was collected through participatory surveys (n=30) from Kanchanpur, Kapilvastu, Rupandehi, Nawalparasi, Palpa and Arghakhanchi districts. The questionnaire focused on distribution and population of Bijaysal along with socio-economic data. Qualitative questionnaires were probed to analyze the diverse use and the status of the species in the forest. Focus group discussions (n=3) were held in Kanchanpur, Kailali and Barida districts with members of Community Forest User Groups, traders, and the representatives of NGOs. The Focus Group Discussions (FGDs) were helpful in locating the natural populations of Bijaysal within the respective districts.

The International Union for Conservation of Nature (IUCN) Red List was referred to identify the global distribution and conservation status of Bijaysal. Literature review helped to enhance understanding on ecology, population, and distribution of the species in Nepal and across the globe. Likewise, several district level consultations were held at Kanchanpur, Kailali, Kapilvastu, Rupandehi, Nawalparasi, Palpa, Arghakhachi, and Bardia districts with stakeholders (DFO, CF personnel, and the staff members of National Park). Moreover, experts were consulted at various stages of the planning process. Then the draft was sent to the experts (MoFE, DoF, DFO, and WWF Nepal) in December 2017 for their input. The draft plan was eventually finalized by incorporating the inputs.

1.3 Structure of the Action Plan

This action plan provides a strategic direction to the Bijaysal bearing states, districts, municipalities, rural municipalities, and community forests for the implementation of recommended measures for sustainable management of the species. It also contains background information on Bijaysal at the global and national level along with the major issues and challenges in its conservation. The concluding section ends with the goal, strategies, and priority actions for Bijaysal conservation in Nepal including the activity matrix and proposed budget.

Chapter 2: Background

2.1 Species Introduction

Bijaysal (Botanical name: *Pterocarpus marsupium* Roxb.; English name: Malabar Kino; Family: Fabaceae) is a medium to large sized deciduous tree that grows up to 33m meters in height (Barstow, 2017). Pterocarpus refers to winged fruit (ptero-winged, carpus-fruit) and marsupium refers to pocket. Thus, *Pterocarpus marsupium* is a tree with winged fruit that is distributed in specific/ pocket areas (Duthie, 1915). The tree bark is grey to dark brown with shallow cracks. A red gum resin (Kino) exudes from the cuts and injuries in the bark. The wood is very hard, close grained, and heartwood is yellowish brown (Troup, 1921; Yadav and Sardesai, 2002). Leaves are compound, imparipinnate (pinnate with a single leaflet at the apex), 15-25 cm, leaflets 5-7, firmly coriaceous, sparingly clothed beneath with persistent appressed (pressed close to) hairs, 4-12 x 2-7 cm wide, elliptic or ovate to lanceolate, nerves 15-20 pairs. Flowers are yellow, borne in large much branched terminal panicles rachis, pedicels rusty puberulous; pedicels 0.2 cm, with 2 small ovate caducous, bracteoles at the apex. Pod is hard, orbicular, stipe 0.2-0.3 cm long, style at some distance above the base periphery of pod between stipe and style convex (Duthie, 1915).

Flowering occurs during August to October and fruiting during January to April in the sub-Himalayan tracts. Bijaysal often grows taller than the Sal (*Shorea robusta*) that enable wide and distant dispersal of seeds, which is further aided by light and winged seed. In a study in community forests of Kanchanpur, Pyakurel and Oli (2014) found seedlings and saplings far from mature trees.

Bijaysal is an epigeal germinating plant (germinates above ground) and seed prefers moist environment and light shade (hard to survive in dense shade) during germination. Owing to the hardness of pod, less germinability and poor viability, the seed germination percentage is lower than 30% (Venkataramaiah *et al.*, 1980; Kalimuthu and Lakshaman, 1995). The seed thus needs loose weed free soil with adequate shelter for germination. The growth of seedling during the first year is very slow: 2-6 inches in natural conditions but may attain up to 3 feet in nurseries with optimal care. The plant reaches 2-5 feet in second year in natural conditions. Growth is stimulated by weeding and soil loosening. Seedlings and saplings are tender and sensitive to frost and drought; latter being more hazardous; thus, protection against sun is recommended. Saplings and poles cannot tolerate dense overhead shade but tolerate lateral shade.

The tree is moderate light demanding and has limited distribution and does not exhibit thick stocking (Troup, 1921). It is found both on undulating and flat ground and grows on variety of soil formations (preferring sandy loam), provided the drainage is good. Bijaysal prefers north aspect and are found either in the pure Sal forest, or Sal mixed with other tree species like Karma *(Adina cordifolia)*, Sindure *(Mallotus philippensis)*, Harro-Barro *(Terminalia* spp.*)*, Khair *(Acacia catechu)* and other trees characteristic of mixed deciduous forest (Troup, 1921).

The species has multiple uses and values. The paste of seed and heartwood decoction is useful in diabetic anemia (Trivedi, 2006). The bark is used for the treatment of stomachache, cholera, dysentery, urinary complaints, tongue disease and toothache (Tiwari *et al.* 2004). Wood of the tree is useful in making the water glasses for diabetic patients (Reddy *et al.* 2008). Likewise, heartwood is astringent, bitter, acrid, cooling, anti-inflammatory, depurative, haemostatic, revulsive, anthelmintic, constipating and rejuvenating (Warrier, 1995). The gum resin (Kino gum) is used to regenerate insulin producing beta cells in pancreas (Mishra, 1993) and to treat stomach and abdominal related problems including acute gastritis (Tiwari *et al.*, 2004). Heartwood and gum is useful in skin and blood related diseases, rejuvenator, diarrhoea, dysentery and toothache (Mishra, 1993). Local residents of Kanchanpur are using Kino gum for body and joint pain.

It provides food to birds and mammals. It is vulture's vantage point (as observed in Suklaphanta) and is the climax partner of *Shorea robusta* (during climax succession). Acharya *et al.* (2002) stated its growth has been improved by protection from grazing, fire and human interferences. The leaves are highly

palatable for livestock, but it is posing threat to its natural regeneration. Seedlings are practically absent in heavily grazed areas (Troup, 1921). Its timber is used to manufacture furniture, cart building (felloes, spokes and bent rim), agricultural implements, grain measures, carving, pit-props and railway carriage construction (Trotter, 1982). Its economic value in Nepal has escalated in recent years due to the use of timber in handicraft (cups, pots). Traditionally, its timber is used to make agricultural tool (plough).

2.2 Global and National Status and Distribution

Bijaysal has a limited global distribution. The species is native to India, Nepal, Bangladesh, Sri Lanka, and Taiwan. Although species has a wide native range (tropical south Asia), its population status across the range is not known (Figure 1). Natural stands of the tree are said to be 'fast disappearing' (Anis *et al.,* 2005).

In Nepal, Bijaysal is naturally distributed along the foothills of Siwalik, from Kanchanpur to Nawalparasi. The population, however, is very scantly distributed due to low germination percentage and slow growth rate. Its natural distribution in Nepal is reported from deciduous tropical forests of seven districts of Terai such as Kanchanpur, Kailali, Bardia, Banke, Kapilvastu, Rupandehi and Nawalparasi districts (Figure 2) in Tarai and adjoining parts of Palpa and Arghakhachi districts within the altitude of 100m to 500m (Pyakurel and Oli, 2014; ESON, 2018; personal communication with District Forest Officers (DFO) of the respective districts). Although there are reports of its availability in other districts (e.g, Makawanpur, Rautahat, Jhapa) also, its natural distribution in those districts remains obscure.

The national population status of this species is unknown but there are few sporadic studies on their population status at local and district level. There are about 400 mature trees in 12 community forests (CF) of Kanchanpur (Pyakurel and Oli, 2014). Likewise, Buddhabhumi-10 of Kapilvastu district has more than 500 mature trees and there are 396 trees at the breeding seed orchard of Department of Forest Research and Survey (DFRS) in Butwal. In addition, the Tree Improvement and Silvicuture Unit (TISU) of the DoF had established a breeding seed orchard in Kanchanpur district.

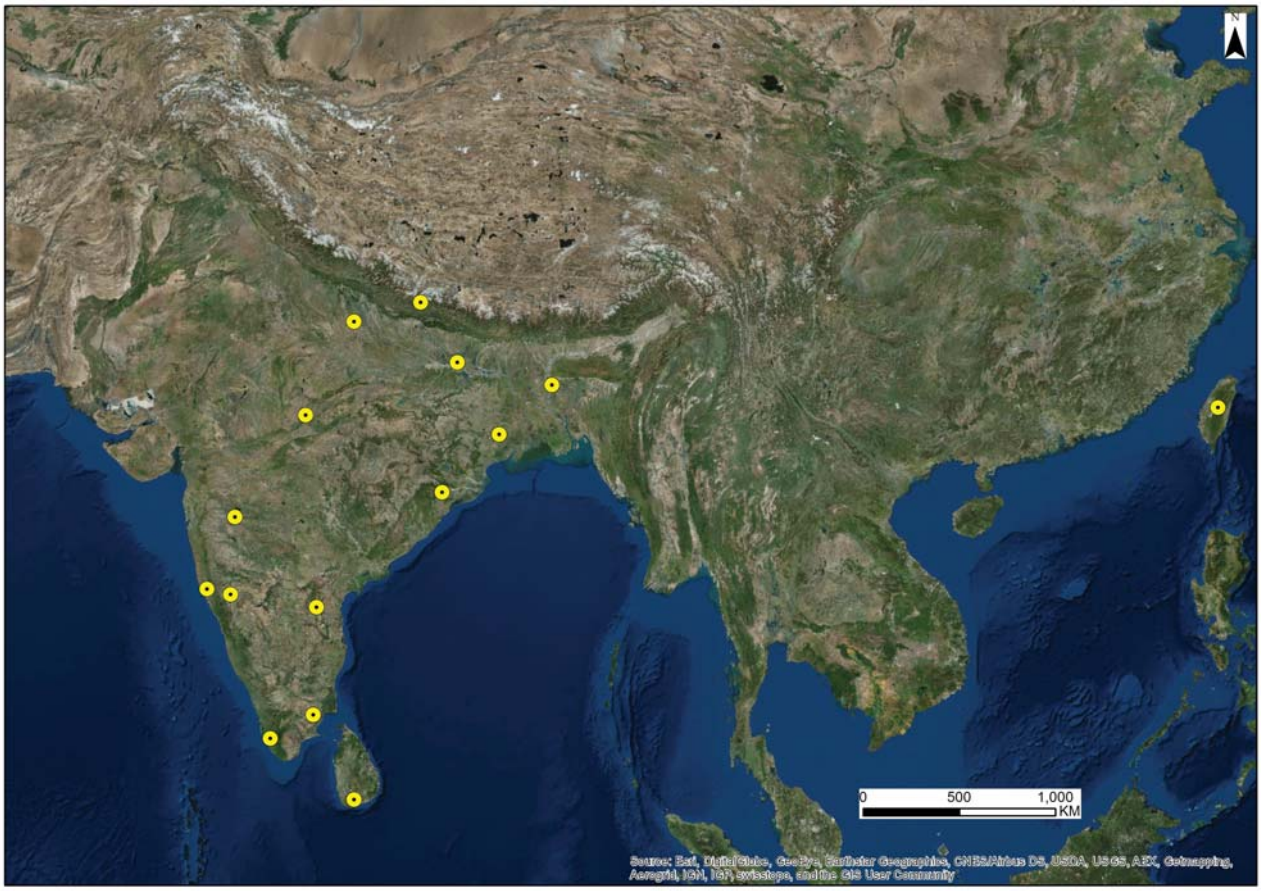

Figure 1: Global distribution of Malabar Kino, Source: IUCN, 2017

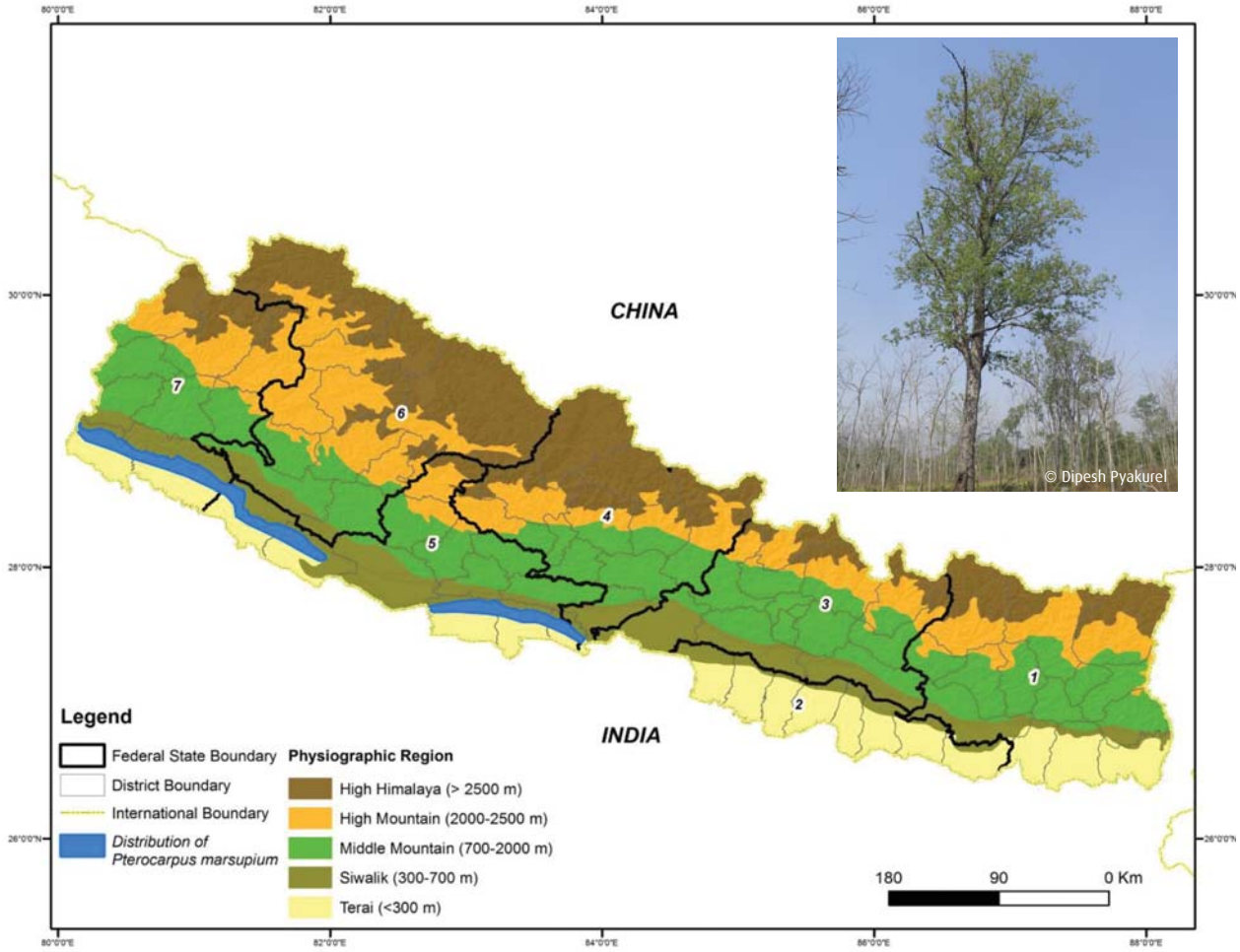

Figure 2: Natural distribution of Bijaysal in Nepal

Chapter 3: Issues, Threats, Challenges and Opportunities

The major issues, threats, challenges and opportunities in Bijaysal conservation are as follows:

3.1 Issues

The following major issues have been identified.

- Low conservation priority at national and local levels,
- Inadequate funding for conservation and research,
- Inadequate awareness regarding its conservation status,
- Loss of habitats due to encroachment of forest and fringe areas for agricultural expansion and infrastructure development,
- Over-grazing and trampling by domestic animals,
- Frequent forest fire, and
- Poor knowledge about the ecology, propagation, demography and population dynamics of Bijaysal.

3.2 Threats and Challenges

Habitat loss, degradation, and fragmentation are the major threats to Bijaysal. Low germination, slow growth rate, localized distribution, and overharvesting are the threats faced by this species. In view of these threats the Government of Nepal has banned the felling, transportation and export of this species under the Forest Regulation 1995 (amended in 2001). The plant is listed as Near Threatened (NT) under IUCN Red List category based on the threats present to the species, decreasing population and declining areas of occurrence (Barstow, 2017). The vegetative propagation has not been very successful either. Endowed with high intrinsic value, this species is under threat from over-harvesting at the local level. Thus, derivatives of the Bijaysal is lucrative to illegal harvesters resulting in unsustainable harvesting, posing threat to their survival and sustainability (Nijman, 2010; Weckerle *et al.*, 2010).

The leaves of this species are highly palatable to livestock and thus the branches of the tree are widely lopped in rural areas. Thus, fodder and litter collection, grazing and trampling together with uncontrolled forest fire will have an adverse impact on the species and its habitat. Development of infrastructures, such as opening of roads and construction of school buildings, hospitals, temples and other infrastructures within forested areas pose serious threats to the forest, species and biodiversity in general. The aim of the Bijaysal Conservation Action Plan is to help and support in the conservation of the species by addressing existing threats and to maintain and improve natural stands.

Figure 3: Lopped Bijaysal trees in Saraswati CF, Kapilvastu

3.3 Collaboration and Coordination

Floral species in general have received low conservation priority. Thus, it is crucial that there should be a greater collaboration among government agencies, conservation partners and the private sector in this regard. Moreover, additional efforts will be needed to tackle over-harvesting and trade in Bijaysal. And since that most of the present distribution range of Bijaysal occur outside the protected areas, there is a need for an effective coordination and collaborated effort among the staff members of the state concerned, forest offices[1], municipalities, rural municipalities, community forest users' groups, individual farmers and the private sector to tackle the issues pertaining to unsustainable harvesting and illegal trade at the local level.

[1] 'District' mainly refers to District Forest Office; however, it is not limited to DFO only. What it denotes presently might change with the adoption of the federal structure and, thus, it should be understood as the district level office managing the forests. This action plan will follow any changes made in the federal structure.

3.4 Opportunities

Despite receiving inadequate priority in the past, the conservation of floral species is gradually getting attention at the national level. There have been conscious efforts for the conservation of key species such as champ, walnut and satisal along with Bijaysal in recent years. Initiatives such as the formulation of floral species conservation action plan, community-based Bijaysal conservation initiatives, documentation of species distribution and population, together with the establishment of demonstration plots and orchards have drawn considerable attention. The planning and implementation of set objectives with high priority at the local level in a well coordinated manner can address the conservation issues relating to this species. Strategic efforts are further substantiated by policy documents such as NBSAP and TAL strategies including other forest related policies. The multiple use and high economic value of this species also provides an opportunity to engage local government and foster public-private partnership in its conservation.

3.5 Laws and Policy Frameworks

The following policy documents, laws, strategies and action plans were reviewed during the formulation of this action plan:

- The Constitution of Nepal
- National Parks and Wildlife Conservation Act 2029 BS (1973)
- Forest Act (1993)
- Environmental Protection Act (1995)
- Nepal Environmental Policy and Action Plan (1993)
- Forest Policy 2071 BS (2015)
- Forestry Sector Strategy (2016-2025)
- Nepal National Biodiversity Strategy and Action Plan (2014-2020)
- Terai Arc Landscape Strategy and Action Plan (2015-2025)
- Nature Conservation National Strategic Framework for Sustainable Development (2015-2030)
- Sustainable Development Goals (2016-2030) National Report
- Nepal Biodiversity Strategy, 2012

Chapter 4: Conservation Efforts and Major Achievements

A few conservation initiatives have been taken through the government, community forests and other conservation partners both at the national and local level.

4.1 National Level Efforts

The following national level initiatives are in relation to the conservation and management of the Bijaysal.

- The GoN has declared and listed Bijaysal as a protected plant and has banned its felling, transportation and export while it is allowed in and from managed forests.
- The DoF has initiated *ex-situ* conservation by establishing Bijaysal breeding seed orchard at Gulariya, Krishnapur-6, Kanchanpur district in 2005.
- Under the Tree Improvement Program, TISU (since 1998) has been working in this regard for the last 20 years. Likewise, the Silviculture Division of DoF has initiated various conservation measures such as barbed wire fencing and posting of forest guards in Saraswoti and Shanti CFs in Kapilvastu district.
- USAID funded Hariyo Ban Program has identified Bijaysal as one of the focal plant species that requires special need for conservation initiative to ensure long-term survival of this species.
- The MoFE and the Hariyo Ban Program have agreed to prepare the conservation and action plan for Bijaysal.
- The DFRS has established a breeding seed orchard having 396 mother trees in Jogikuti, Butwal.

4.2 District Level Efforts

Following the declaration of Bijaysal as a protected plant, conservation efforts have been initiated by various institutions in a number of districts. Some of the major initiations are as follows:

- In 2014, DFO Kanchanpur initiated counting of Bijaysal trees in collaboration with local Community Forest User Groups. Likewise, the Hariyo Ban Program is mobilizing the assistance through the Federation of Community Forestry Users, Nepal (FECOFUN). The aforementioned activities include:
  - Identification and listing of areas with natural stands of Bijaysal
  - Spatially counted individual mature Bijaysal trees in Sahid Smriti CF, Barkunda (Figure 5).
  - Promoted artificial propagation in Sayapatri CF, Krishnapur-6 by establishing a breeding seed orchard.
  - Grazing Management in CFs (Betkot CF, Baijanath CF).
  - Awareness raising through the mobilization of Civil Society Organizations (CSO).
  - Information sharing and dissemination through articles, booklets, e-reports etc.
- DFO Kailali has initiated a few conservation measures in the CFs of Sabaili, Naumule (Khairala-1) and in Nirajan, Sinhasan and Bhartal collaborative forest in Urma. In addition, around 200 trees have been estimated in private farms in Malakheti.
- In collaboration with Silviculture Division of the DoF, the DFO of Kapilbastu has launched Bijaysal conservation activities in 11.76 hectares of land in Saraswoti and Shanti CFs as part of 'Bijaysal *in-situ* Conservation' program with the assistance of USAID Funded Hariyo Ban Program (Figure 4).
- DFO Nawalparasi has identified a few blocks of Dumkibas Arunkhola forest and a community forests as priority sites for the conservation of Bijaysal.
- DFO Rupandehi has recorded Bijaysal trees in Lumbini collaborative forest, Shankar Nagar (Trilottama-2) CF, Pragati, Smriti and Butu (Devdaha 9, 7, 5 and 6) CFs and Sainamaina and Kanchan Municipalities.
- The Forest Silviculture Division has made an inventory and tagged Bijaysal in Kapilvastu for tree seed stand and seed source protection.
- Effective *in-situ* conservation of the species in northern parts of Shuklaphanta National Park.
- Bijaysal seedlings are being raised by private nurseries in Bardia district.
- The District Plant Resources Office, Kailali has started raising Bijaysal seedlings in its nursery.

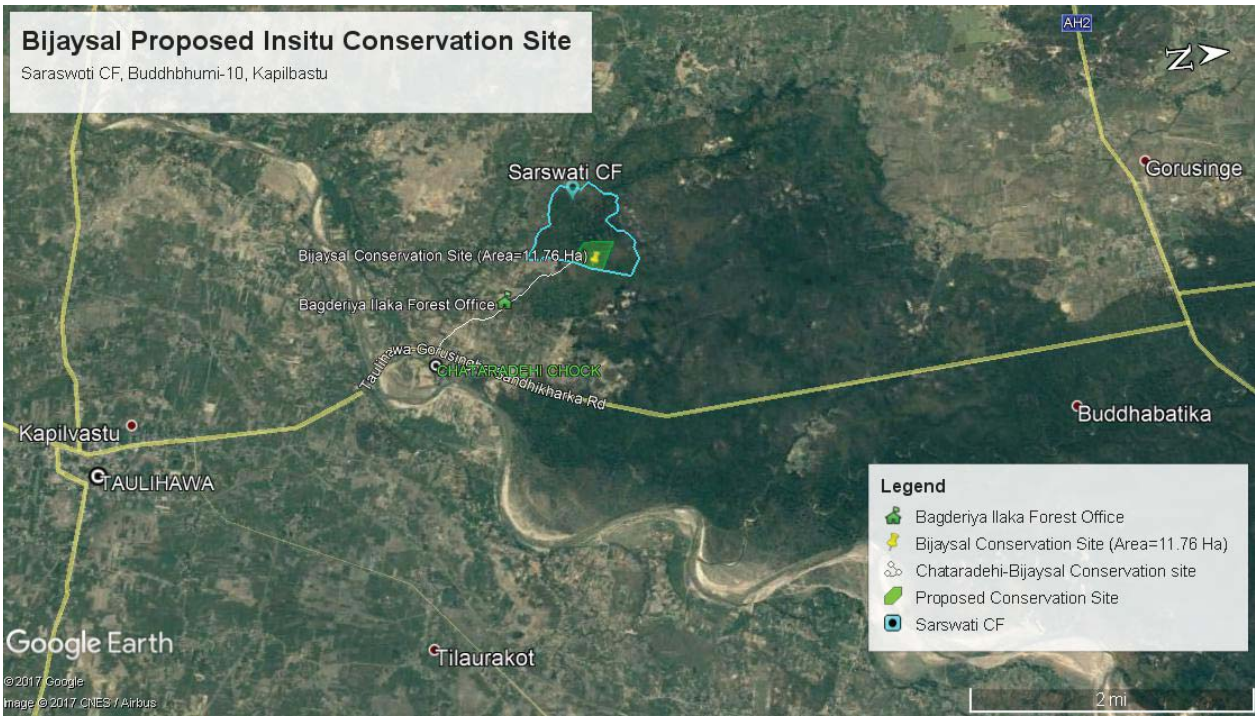

Figure 4: Proposed Bijaysal conservation site in Kapilvastu

Figure 5: Tagged trees in Kanchanpur

Chapter 5: Conservation Action Plan

5.1 Goal

The population status and distribution of Bijaysal will be improved across its range, with existing threats from over-exploitation and habitat destruction minimized.

5.2 Objectives, Strategies and Actions

The main objective of this plan is to maintain a healthy population of Bijaysal, while promoting its *in-situ* and *ex-situ* conservation measures to ensure its sustainable use in Nepal.

Strategy 1: Enhance understanding and knowledge on Bijaysal and its status, distribution, propagation, ecology and habitat

Rationale:

The information on Bijaysal in Nepal is limited. There is a lack of extensive research on Bijaysal on the part of government organizations, academia, FUGs and the stakeholders that are working in this sector. There is a need for an integrated and collaborative approach to bring research institutions, government organizations and conservation organizations to optimize available resources to generate and management of scientific knowledge regarding this Near Threatened species.

Outputs:

- *Adequate information on the population status, distribution, ecology, and propagation of Bijaysal generated and updated*
- *Research findings incorporated in designing and implementation of Bijaysal conservation programs*
- *Public awareness on Bijaysal conservation enhanced*

Activities:

- Resource assessment (population status and regeneration) of Bijaysal in all potential areas including Kanchanpur, Kailali, Bardia, Banke, Kapilvastu, Rupandehi and Nawalparasi districts
- Pilot initiatives such as germination enhancement (rubbing the seed with sand and soaking them in water in the nursery) in the priority districts such as Kanchanpur and/or Kapilvastu
- Undertake germination test and piloting in laboratories, and transplanting the seedlings in priority districts
- Analyse soil samples in Nepal Agricultural Research Council (NARC), DFRS or other laboratories to identify the characteristics that suits Bijaysal propagation and germination
- Tie up integrated species management (germination, rearing, use, biochemical analysis) with universities, research institutions and government organizations to garner better knowledge on the species
- Undertake action research with a focus on habitat and regeneration management of potential habitats and private farms by engaging local forest user groups and farm holders
- Engage academic institutions and conservation organization in long-term research and monitoring to generate information on this species
- Disseminate the outcomes of research studies through publications, workshops, seminars and knowledge portals
- Disseminate promotional and awareness material such as posters, pamphlets, brochures, audio- visuals etc. describing the use (medicinal, economic), threats (overexploitation, grazing, fodder collection), conservation (in situ and ex situ), cultivation and propagation

- Prepare, publish and disseminate monograph on Bijaysal
- Organize mass awareness campaign and activities in schools, communities and incorporating it in non-formal education
- Mobilize media and local FMs for awareness on Bijaysal conservation

Strategy 2: Increase the viable population of Bijaysal by 15% at the national level through the management of priority sites

Rationale:

Low germination percentage and slow growth rate, cutting and felling of (Bijaysal) tree for medicinal and economic purposes, coupled with livestock grazing and fodder collection are the major causes leading to the decline of this species. The vegetative propagation of the species is also challenging. Owing to the prevailing threats and poor (30%) germination success, *in-situ* and *ex-situ* conservation measures is envisioned to increase the Bijaysal trees by atleast 15%. Open livestock grazing is traditionally practiced in Nepal which is considered to be the second most destructive threat to the species after logging and felling. Unregulated collection of fodder and human-induced forest fires also pose threats to germination and Bijaysal saplings that are further aggravated by extended dry spells. Thus conservation management practices will be mainstreamed through community participation in pocket areas. A few CFs have a high density of the species owing to the ban on open grazing and illegal fodder collection. Such CFs should be provided incentives for their conservation efforts and encouraged to promote Bijaysal. This action plan aims to manage about 1000 hectares of potential Bijaysal habitat in the seven districts having natural populations.

Outputs:

- *Priority areas for Bijaysal conservation mapped*
- *Key threats in the form of grazing, forest degradation, and forest fire reduced*
- *Priority distribution areas of Bijaysal secured and managed*

Activities:

- Identification, securing and designation of potential habitats as high priority zones of Bijaysal management in all seven districts (Kanchanpur, Kailali, Bardia, Banke, Kapilvastu, Rupendehi and Nawalparasi)
- Development of *in-situ* demo plot in each of the seven districts
- *In-situ* conservation in Kapilvastu and Kanchanpur through management interventions
- Regulating of open grazing and fodder collection (Bijaysal) and promotion of stall-feeding in priority areas
- Restriction on excessive harvesting of *Kino* Gum
- Distribution of adequate fire-fighting gears and application of fire control measures in priority sites
- Incorporation of forest fire control measures in the operational plans of FUGs and the district forestry sector plan so as to implement it in Bijaysal priorities areas
- Declaration of priority areas as Bijaysal pocket area
- Prepare protection of forest areas with high seedlings or saplings in order to facilitate disturbance-free natural regeneration.
- Establishment of nursery and distribution of fodder tree saplings including saplings for forage farming (e.g., *Badahar, Dudhilo*) to FUGs where habitat management program will be launched
- Propagation of saplings from CFs with high growing stock (e.g. Baijanath and Siddhababa CFs of Kanchanpur and Sawaswoti and Shanti CFs of Kapilvastu) and transplanting them to other priority areas with lesser number of seedlings and saplings
- Include and prioritize Bijaysal Conservation in the operation plans of FUGs, mainly in high priority districts such as Kanchanpur and/or Kapilvastu
- Enrichment plantation of seedlings in forests, private and public lands, along with the conservation of seedlings and saplings, while also enriching the plantation

Strategy 3: Strengthen multi-stakeholder participation for conservation of Bijaysal

Rationale:

In general there is low level of understanding on the importance of floral species conservation. Inadequate awareness among stakeholders on the ecological importance of Bijaysal is one of the main reasons for its over-exploitation and habitat destruction. Further, conservation of any species requires adequate awareness and information both at the grassroots and decision-making levels. Moreover, developing local stewardship could prove an important and effective strategy for Bijaysal conservation. Community based NRM groups such as BZUCs, CFUGs, community forest guards, local youth clubs, eco-clubs, and mothers' groups can play a

pivotal role in its conservation. Given the distribution of Bijaysal in the private lands, conservation effort should also incorporate the private sector and homestead. In view of the high value of the species, conservation efforts should emphasize in developing of local stewardship in the conservation of Bijaysal and their habitat. The conservation efforts should also aim to diversify livelihood opportunites targeting local communities dependent in forest resources. This will ultimately help to reduce over-exploitation of the species.

Outputs

- *Multi-stakeholder engagement for Bijaysal conservation ensured*
- *Capacities of community based NRM groups,* Community based Anti-Poaching Units (*CBAPUs), youth groups/clubs, eco-clubs and mother's group enhanced*
- *Local livelihood improved through conservation and management of Bijaysal and local stewardship developed*

Activities:

- Stakeholder consultations for conservation of Bijaysal
- Encourage authorities at each tier of local government, municipalities, rural municipalities, to provision adequate priority to and ensure budgetary provision for Bijaysal conservation during the process of annual planning
- Encourage and engage private nurseries to produce Bijaysal seedlings in seven districts
- Engage academic institutions and conservation organizations to support research and monitoring, propagation, conservation and management of Bijaysal
- Collaboration with the private sectors for value additions of Bijaysal
- Capacity enhancement of potential NRM groups, community based organizations, local social groups (e.g. Mother groups, youth groups etc.), CBAPUs, youth clubs and eco-clubs, and the initiation of Bijaysal conservation initiatives
- Impart training to local forest user groups and communities with regard to the implementation of conservation action plan
- Conduct exposure visits to Bijaysal conserved areas to raise awareness
- Capacity enhancement training in making wooden cups and pots so as to minimize waste
- Management of dead/fallen/trees and the plots of managed forest in relation to providing Bijaysal to existing cottage industries
- Ensuring the buy-back guarantee of seedlings by FO and selling them to other FUGs and individuals at a subsidized price (200,000 seedlings)
- Encourage and support local farmers and community managed forests for Bijaysal plantation in seven Bijaysal occurring districts
- Documentation and bio-registration of ethno-botanical knowledge on *Kino* Gum and wood

Chapter 6: Implementation Arrangements

6.1 Institutional Arrangements

The action plan will be implemented by the MoFE and Environment through its departments in coordination with all level of government and local communities. The Department of National Parks and Wildlife Conservation (DNPWC) will be responsible for its implementation in the protected areas and their buffer zones whereas the DoF will be responsible for implementing related activities outside the protected areas. Likewise, the Department of Plant Resources (DPR) will play the role of bringing value addition to Bijaysal. Related conservation programs will also be implemented through local municipalities and rural municipalities. Community managed forests will play critical roles in *in situ* conservation of this species.

6.2 Financial Resources

This section of action plan provides indicative financial resources required for implementation of activities specified in the plan. The total budget estimated for the duration of the program as specified in the action plan to implement the proposed activities (Table 1) is NRs. 52,150,000 (USD 521,500)[2]. The output-wise detailed budget is shown in **Annex 1.**

6.3 Sustainable Financing

Of the total estimated budget required to implement the action plan, a large proportion of which will be sourced from the government budget allocated for respective protected areas, the state concerned and district forest offices. In addition to the government budget, the landscape-level conservation programs, presently being supported by conservation partner organizations such as National Trust for Nature Conservation (NTNC), World Wildlife Fund Nepal (WWF), Zoological Society of London (ZSL), USAID and IUCN, are also expected to make significant contribution to this program. Since that the species is reported widely in community forests, a portion of revenue generated by them through the sale of forest products and local tourism could also be ploughed back for conservation of this species at the local level. In view of the responsibility of local government bodies towards local biodiversity conservation, funds from municipalities and rural municipalities are also expected in this regard.

Table 1: **Proposed year-wise budget allocation (NRs. 000)**

Strategies	Year I	Year II	Year III	Year IV	Year V	Total	%
Strategy 1: Enhance understanding and knowledge on Bijaysal and its status, distribution, propagation, ecology and habitat	2950	2950	3350	2800	2300	14350	27
Strategy 2: Increase the viable population of Bijaysal by 15% at the national level through the management of priority sites	4300	4400	4300	4400	4300	21700	42
Strategy 3: Strengthen multi-stakeholder participation for conservation of Bijaysal	3100	3900	3100	3500	2500	16100	31
Total	**10350**	**11250**	**10750**	**10700**	**9100**	**52150**	
Percentage per year	20	22	21	21	17	100	

[2] Exchange rate: 1US$=NRs. 100

6.4. Major Stakeholders

MoFE and DoF will be the major government institution responsible for implementation of the action plan in areas outside the PAs, while DNPWC will be responsible for its implementation within the PA system. Conservation partners such as NTNC, WWF Nepal, ZSL, USAID, FECOFUN, academic institutions (universities and colleges), community based organizations i.e. forest user groups and other relevant organizations and the private sector will be encouraged to support the implementation of this action plan.

6.5 Implementation, Monitoring, Evaluation and Review of the Plan

The DoF will be responsible for the coordination and implementation of this action plan at the provincial/ state level in close collaboration with the Ministry of Industry, Tourism, Forests and Environment and respective offices. Likewise, DoF will oversee it in conjunction with DNPWC and the DPR at the federal level. It will also work with other agencies in this regard. The budgetary need will be managed through the regular support program of the government of Nepal and the support of other conservation and local partners (IUCN, WWF Nepal, GIZ, NTNC, FECOFUN, USAID Care Nepal, Rastrapati Chure Terai Madhesh Samarakshan Bikash Samiti etc). The conservation and local partners will support the Government to implement the activities in close coordination with the DoF and the state offices concerned. The proposed activities will be jointly implemented by local governments, the forest offices, Protected Area offices and the forest user groups. The plan also envisages a mid-term review, with possible changes in it. The DNPWC will be responsible for the monitoring and evaluation of the proposed activities inside the protected areas and buffer zones, whereas the DoF and state government will be responsible for monitoring and evaluating such activities outside the protected areas i.e. community forests and other forested areas. The MoFE or DoF will review this action plan towards the end of project period with the support of conservation partners. If deemed necessary, a mid-term review of the action plan will also be conducted. The findings of and the lessons learned from these periodic reviews will be used in the next action plan.

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Annex

Annex 1: Activity matrix with budget and responsibility for five years (NRs. 000)

Strategies and outputs	Activities	Responsible organization/group	Budget (estimated) in NPR '000					Total	%
			Yr I	Yr II	Yr III	Yr IV	Yr V		
Strategy 1: Enhance understanding and knowledge on Bijaysal and its status, distribution, propagation, ecology and habitat			**2950**	**2950**	**3350**	**2800**	**2300**	**14350**	**27**
Adequate information on the population status, distribution, ecology, and propagation of Bijaysal generated and updated	1. Resource assessment (population status and regeneration) of Bijaysal in all potential areas including Kanchanpur, Kailali, Bardia, Banke, Kapilvastu, Rupandehi and Nawalparasi districts	DNPWC, DoF, FO	1000		1000			2000	5100
	2. Pilot initiatives such as germination enhancement (rubbing the seed with sand and soaking them in water in the nursery) in the priority districts such as Kanchanpur and/or Kapilvastu	FO, FUG,		300	300			600	
	3. Undertake germination test and piloting in laboratories, and transplanting the seedlings in priority districts	DFRS, DPR, Development partners		500	500	500		1500	
	4. Analyse soil samples in Nepal Agriculture Research Council (NARC), DFRS or other laboratories to identify the characteristics that suits Bijaysal propagation and germination	DoF, Forest Silviculture Divisions		500		500		1000	
Research findings incorporated in designing and implementation of Bijaysal conservation programs	5. Tie up integrated species management (germination, rearing, use, biochemical analysis) with universities, research institutions and government organizations to garner better knowledge on the species	DoF, Development partners	250	250	250	500	500	1750	5550
	6. Undertake action research with a focus on habitat and regeneration management of potential habitats and private farms by engaging local forest user groups and farm holders	DoF, Development partners	500		500		500	1500	
	7. Engage academic institutions and conservation organization in long-term research and monitoring to generate information on this species	DoF, DPR, DFRS, Development partners, Academic institutions	200	200	200		200	800	
	8. Disseminate the outcomes of research studies through publications, workshops, seminars and knowledge portals	DoF, Development partners		500		500	500	1500	

Strategies and outputs	Activities	Responsible organization/group	Budget (estimated) in NPR '000					Total	%
			Yr I	Yr II	Yr III	Yr IV	Yr V		
Public awareness on Bijaysal conservation enhanced	9. Disseminate promotional and awareness material such as posters, pamphlets, brochures, audio- visuals etc. describing the use (medicinal, economic), threats (overexploitation, grazing, fodder collection), conservation (*in-situ* and *ex-situ*), cultivation and propagation	DoF, DFRS, DPR, Development partners	300	300	200	200	200	1200	3700
	10. Prepare, publish and disseminate monograph on Bijaysal	DoF, DFRS, DPR, Development partners	300			200		500	
	11. Organize mass awareness campaign and activities in schools, communities and incorporating it in non-formal education	FO, CBOs	300	300	300	300	300	1500	
	12. Mobilize media and local FMs for awareness on Bijaysal conservation	Local media	100	100	100	100	100	500	
Strategy 2. Increase the viable population of Bijaysal by 15% at the national level through the management of priority sites			**4300**	**4400**	**4300**	**4400**	**4300**	**21700**	**42**
Priority areas for Bijaysal conservation mapped	13. Identification, securing and designation of potential habitats as high priority zones of Bijaysal management in all seven districts (Kanchanpur, Kailali, Bardia, Banke, Kapilvastu, Rupendehi and Nawalparasi)	FO, FUGs, Development partners	100	100	100	100	100	500	4000
	14. Development of *in-situ* demo plot in each of the seven districts	FO, Park Office, Development partners	400	400	400	400	400	2000	
	15. *In-situ* conservation in Kapilvastu and Kanchanpur through management interventions	CF, FO, LG	500		500		500	1500	
Key threats in the form of grazing, forest degradation, and forest fire reduced	16. Regulating of open grazing and fodder collection (Bijaysal) and promotion of stall-feeding in priority areas	FO, Park office, FUGs, LG	300	300	300	300	300	1500	7300
	17. Restriction on excessive harvesting of *Kino* Gum	FO, Protected Area office, FUG, LG	400	400	400	400	400	2000	
	18. Distribution of adequate fire-fighting gears and application of fire control measures in priority sites	FO, DoF, Development partners	600	600	600	600	600	3000	
	19. Incorporation of forest fire control measures in the operational plans of FUGs and the district forestry sector plan so as to implement them in Bijaysal priorities areas	FUGs, Development partners		400		400		800	

Strategies and outputs	Activities	Responsible organization/group	Budget (estimated) in NPR '000					Total	%
			Yr I	Yr II	Yr III	Yr IV	Yr V		
Priority distribution areas of Bijaysal secured and managed	20. Declaration of priority areas as Bijaysal pocket area	FO, DoF, Development partners		200		200		400	10400
	21. Prepare protection of forest areas with high seedlings or saplings in order to facilitate disturbance-free natural regeneration.	FO, FUG, Development partners	400	400	400	400	400	2000	
	22. Establishment of nursery and distribution of fodder tree saplings including saplings for forage farming (e.g., *Badahar, Dudhilo*) to FUGs where habitat management program will be launched	FO, Development partners	500	500	500	500	500	2500	
	23. Propagation of saplings from CFs with high growing stock (e.g. Baijanath and Siddhababa CFs of Kanchanpur and Sawaswoti and Shanti CFs of Kapilvastu) and transplanting them to other priority areas with lesser number of seedlings and saplings	FO, Development partners	400	400	400	400	400	2000	
	24. Include and prioritize Bijaysal Conservation in the operation plans of FUGs, mainly in high priority districts such as Kanchanpur and/or Kapilvastu	FO, Protected Area office, FUGs	200	200	200	200	200	1000	
	25. Enrichment plantation of seedlings in forests, private and public lands, along with the conservation of seedlings and saplings, while also enriching the plantation	FUG, FO, individuals	500	500	500	500	500	2500	
Strategy 3: Strengthen multi-stakeholder participation for conservation of Bijaysal			**3100**	**3900**	**3100**	**3500**	**2500**	**16100**	**31**
Multi-stakeholder engagement for Bijaysal conservation ensured	26. Stakeholder consultations for conservation of Bijaysal	FO, DoF, Development Partners	100	100	100	100	100	500	6000
	27. Encourage authorities at each tier of local government, municipalities, rural municipalities, to provision adequate priority to and ensure budgetary provision for Bijaysal conservation during the process of annual planning	FO, DoF, Development Partners	100	100	100	100	100	500	
	28. Encourage and engage private nurseries to produce Bijaysal seedlings in seven districts	Private sector (PS), FO	300	300	300	300	300	1500	
	29. Engage academic institutions and conservation organizations to support research and monitoring, propagation, conservation and management of Bijaysal	Development partners, Academic Institutions	500	500	500	500	500	2500	
	30. Collaboration with the private sectors for value additions of Bijaysal	PS	200	200	200	200	200	1000	

Strategies and outputs	Activities	Responsible organization/group	Budget (estimated) in NPR '000					Total	%
			Yr I	Yr II	Yr III	Yr IV	Yr V		
Capacities of community based NRM groups, CBAPUs, youth groups/clubs, eco-clubs and mother's group enhanced	31. Capacity enhancement of potential Natural Resource Management (NRM) groups, community based organizations, local social groups (e.g. Mother groups, youth groups etc.), Community based Anti-Poaching Units (CBAPUs), youth clubs and eco-clubs, and the initiation of Bijaysal conservation initiatives	FO, DoF, Development Partners, FUGs	600	600	600	600	600	3000	6000
	32. Impart training to local forest user groups and communities with regard to the implementation of conservation action plan	FO, Development partners	200	200	200			600	
	33. Conduct exposure visits to Bijaysal conserved areas to raise awareness	FO, DoF, Development partners		1000		1000		2000	
	34. Capacity enhancement training in making wooden cups and pots so as to minimize waste	PS	200		200			400	
Local livelihood improved through conservation and management of Bijaysal and local stewardship developed	35. Management of dead/fallen/trees and the plots of managed forest in relation to providing Bijaysal to existing cottage industries	FO	100	100	100	100	100	500	4100
	36. Ensuring the buy-back guarantee of seedlings by FO and selling them to other FUGs and individuals at a subsidized price (200,000 seedlings)	FO, PS	100	100	100	100	100	500	
	37. Encourage and support local farmers and community managed forests for Bijaysal plantation in seven Bijaysal occurring districts	FO, Development partners, FUGs	500	500	500	500	500	2500	
	38. Documentation and bio-registration of ethno-botanical knowledge on *Kino* Gum and wood	PS, DoI, Development partners	200	200	200			600	
TOTAL			**10350**	**11250**	**10750**	**10700**	**9100**	**52150**	
Year-wise percentage			**19**	**23**	**20**	**22**	**21**		