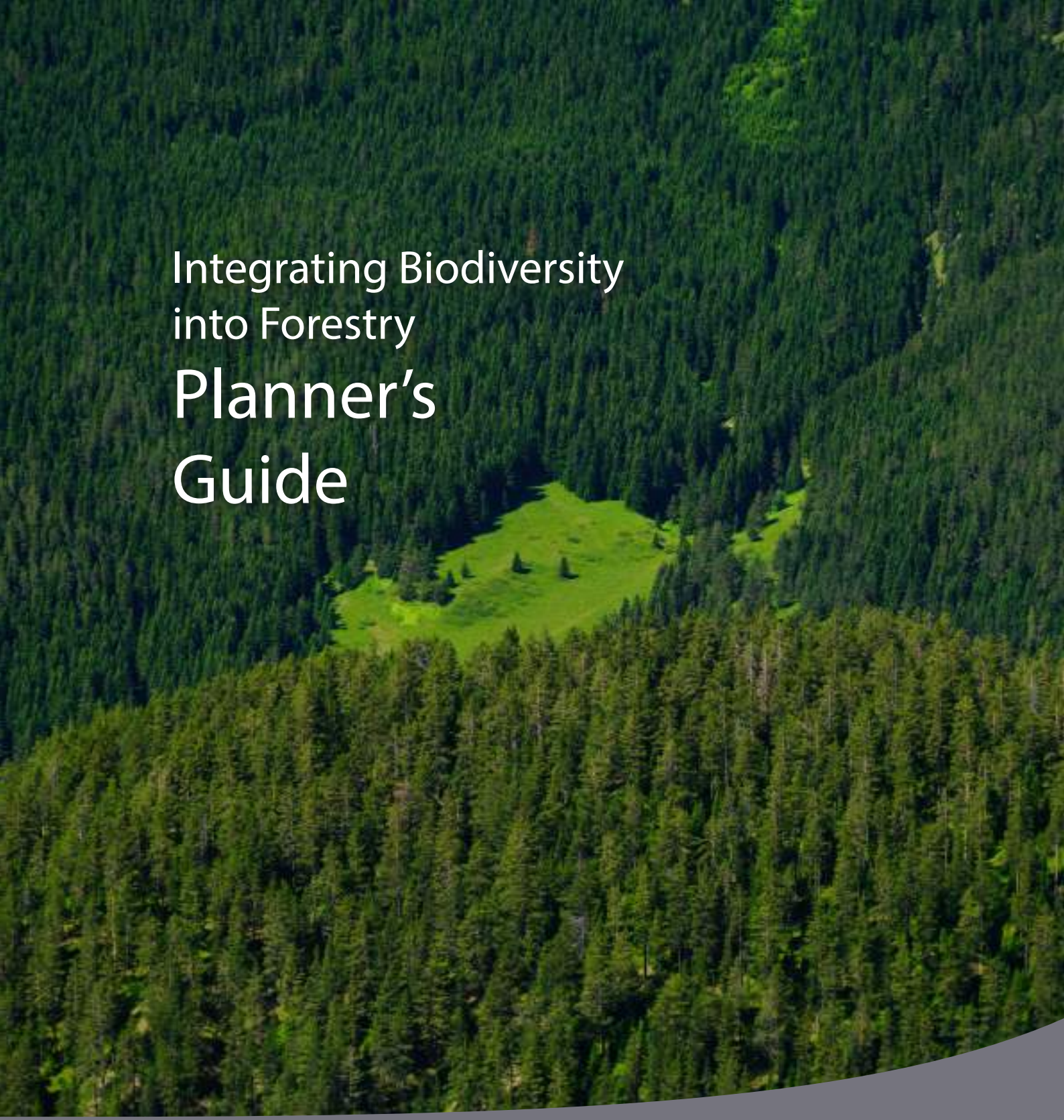


Integrating Biodiversity into Forestry

Planner's Guide

Empowered lives.
Resilient nations.

Integrating Biodiversity into Forestry - PLANNER'S GUIDE
Nature Conservation Centre (DKM), Ankara, Turkey
ISBN: 978-605-06990-1-2

Nature Conservation Centre (DKM)
ODTÜ Sitesi 1594 Sok. No:3 Çiğdem Mah., Ankara, Turkey
Tel: 0312 287 81 44
www.dkm.org.tr
Sertifika No: 35069

1. Edition: Ankara, January, 2020

Chapter Authors
Chapter 1: Introduction
Yıldıray Lise, İrem Tüfekcioğlu, Hüma Ülgen, C. Can Bilgin, Uğur Zeydanlı
Chapter 2: Inventory of Species with Conservation Priority
Didem Ambarlı, Ayşe S. Turak
Chapter 3: Identifying Other Elements of Biodiversity and Their Inventory
Uğur Zeydanlı
Chapter 4: Analysis of the Biodiversity Data
Ayşe S. Turak
Chapter 5: Using Biodiversity Outputs in Forest Management Planning
Deniz Özüt, Mehmet Demir, Ömer Karademir, Rüstem Kırış
Chapter 6: Auditing of Works
Deniz Özüt, Ömer Karademir
Chapter 7: Monitoring of the Practices
Deniz Özüt, Yıldıray Lise, İrem Tüfekcioğlu, Hüma Ülgen
Editors: Uğur Zeydanlı, Deniz Özüt
Production Coordinator: Yıldıray Lise, İrem Tüfekcioğlu
Graphic Design: Güngör Genç
Publication: Dumat Offset Printing

In the preparation of this book, Uğur Zeydanlı, who is one of the editors of this book has used the works he conducted while he was a Visiting Researcher at Yale School of Forestry and Environmental Studies, Global Institute of Sustainable Forestry, which he attended within the context of the Fulbright Visiting Scholar Program.

Citation:

Recommended for the full text:
Zeydanlı, U. , Özüt, D. (editors) 2020. Integrating Biodiversity into Forestry – Planner's Guide. Ankara, Nature Conservation Center, 173 pages.

For a chapter, please cite according to the authors, by using the following example:
Lise, Y., Tüfekcioğlu, İ., Ülgen, H., Bilgin, C.C., Zeydanlı, U. 2020. Introduction. Page 1-22. Zeydanlı, U., Özüt, D. (editors) 2020. Integrating Biodiversity into Forestry – Planner's Guide. Ankara, Nature Conservation Center, 173 pages.

"Integrating Biodiversity into Forestry – Planner's Guide" book was prepared in light of the experiences acquired through the projects supported by the BTC – Environmental Investment Program and Directorate General of Forestry and was published within the scope of the "Integrated Approach to Management of Forests in Turkey, with Demonstration in High Conservation Value Forests in the Mediterranean Region" which is being conducted with the financial support of the Global Environment Fund (GEF) by the Directorate General of Forestry in cooperation with the United Nations Development Programme (UNDP).

Integrating Biodiversity into Forestry

Planner's Guide

Acknowledgement

We thank all those who helped to complete this book and owe an apology to those whom we mistakenly forgot to thank.

Cafer Akdeniz, Caner Akgül, Sedat Akın, Ziyaeddin Akkoyunlu, Hüseyin Albayrak, Murat Altunal, H. Cihad Anlar, A. Tolga Arslan, Fethi Arslan, Mehmet Aydın, Mustafa Aydın, Sıddık Aydın, Burhan Aydoğan, Mehmet Sıraç Batuk, Charles Bettigole, Burcu Bursalı, Tevfik Büyükgebiz, Kemal Can, Mehmet Ceylan, Yılmaz Ceylan, Ahmet Cort, Kris Covey, Ayhan Çağatay, Murat Çevirme, Mehmet Demir, Oktay Demir, Cemil Demirci, Ramazan Dikyar, Ali Dinç, Murat Durmuş, Enver Elmas, Mustafa Elmas, Mehmet Erol, Ahmet Ersoy, Tamer Ertürk, Yücel Fırat, Henry Glick, Selçuk Göktürk, Zeki Görgü, Yılmaz Gün, Yasin Gündüz, Emin Güzenge, Ergin Kahraman, Ömer Karademir, Osman Karaelmas, Gürsel Karagöz, Fazlı Karakaş, Ömer Naci Kaya, Kamil Kılıç, Mehmet Kılıç, Rüstem Kırış, G. Metin Kocaeli, Mithat Koç, Bahtiyar Kurt, Hayrettin Küçük, Mahir Küçük, Bekir Ilgar, Talat Memiş, Necdet Mengen, Akın Mızraklı, Levent Morkan, Gökhan Oğuz, Chadwick Dearing Oliver, Fatma Arf Oliver, Tuba Bucak Onay, Bahattin Örs, Nurettin Özbağdatlı, Hilmi Özdemir, Serdar Özkan, Murat Özmen, A. Kenan Öztan, Rıfat Öztürk, Yavuz Öztürk, Sait Sağlam, Nadir Sarıkaya, M. Ali Sayın, Yunus Seven, Ergün Süner, Abbas Şahin, Günal Şahin, Fuat Şanal, Ali Şimşek, Sabrina Szeto, Zafer Toksoy, Galip Çağtay Tufanoğlu, Reşat Tunç, Nedim Tuylu, Ahmet Ulukanlıgil, Cemil Ün, Turgay Vatan, Ş. Armağan Yalçın, Taner Yamak, Mehmet Yıldız, Salih Yılmaz, Adnan Yılmaztürk, Mustafa Yurdaer, İbrahim Yüksel.


©Uğur Zeydanlı

Foreword

21st century marks a period when our world goes through a rapid process of growth and development while having to deal with environmental disasters. On top of the list of disasters comes the loss of natural habitats and reduced biodiversity due to climate change. Yet, biodiversity and natural ecosystems as well as the benefits and services provided by these ecosystems are indispensable to the prosperity and development of societies. That is why, international organizations have defined 'sustainable development' as the global development vision. Sustainable management of forests has been the Directorate General of Forestry's key purpose, since inception: "Safeguard forests and forest resources, improve them with an understanding that aligns with that of nature, and sustainably manage them within the ecosystem, ensuring that they offer multiple benefits to the society."

Since the year 1839, Directorate General of Forestry has been aiming to achieve sustainable management of forests by striking a balance between conservation and usage. Of course, definitions assigned to the concepts of conservation and usage have gone through a series of changes since then. Although our approach to conservation in the past was rather associated with forest presence and forest lands, the 'quality' of forest presence has -over time- become an increasingly meaningful assessment criterion. Moreover, 'quality of forests' has gradually become something judged by the forest ecosystem's ecological characteristics and biodiversity.

Forests of Turkey are among the most distinctive forests of the northern hemisphere. Not only our forest lands in the northeast of the country, but also our forest ecosystem in the Aegean and Mediterranean regions rank among the top 35 conservation priority hotspots, hosting thousands of living species. Although they are mostly taken for granted, considering the ecological functions they fulfil, these species happen to be the insurance for the survival of our forests. That is why, sustainable management of forests must absolutely entail a key objective of also conserving these beings.

The ecosystem-based functional forest management planning which we -as the Directorate General of Forestry- have been doing our best to disseminate from 2000 onwards is a powerful tool we can wield to reach our goal. Since 2008 when we began to intensively implement the functional planning approach, we have been trying to integrate practices that value biodiversity into these plans.

Thanks to the more than a decade of partnership between the Directorate General of Forestry and Nature Conservation Center, how to integrate biodiversity into forest planning and management in Turkey has now been clearly defined. The foregoing guide is one the two major works produced addressing this subject.

This guide will provide our colleagues in charge of forest management working in the field with valuable guidance on how to recognize the elements of biodiversity in their own directorates and units, the kind of forest structure these species need and the specific actions they need to take as part of their practices.

Addressing a major gap, this guide will hopefully light the way for our entire staff in their efforts for the conservation of biodiversity - a key aspect of sustainable management of forests.

Bekir Karacabey
Director General of Forestry

Foreword

Conservation of biodiversity and ecosystem services are key to human life and sustainable development. As of today, we have already degraded several ecosystems and caused the decline of species and the pace of extinction is unfortunately increasing. Loss of biodiversity is causing a misfunctioning of ecosystem services that are crucial for human well-being, food, water and air provisions. The consequences are not only limited to humans, they affect all living beings that we are sharing our planet with. Convention on Biological Diversity sets the rational and solutions through Aichi Targets that emphasize five strategic goals as a pathway. These include addressing the causes of biodiversity loss by mainstreaming biodiversity, reduce the direct pressure, improve the status of species, enhance the benefits to all from biodiversity, and improve the implementation. In line with this priority setting, UNDP has put in place its new strategy document with three development settings and six signature solutions. The development settings take the resilience issue as a pillar subject and identify "promoting the nature-based solutions for a sustainable planet" as one of its signature solutions.

UNDP Turkey, having a strong history of cooperation with the Government of Republic of Turkey, has been implementing various programs and projects for biodiversity and natural resource conservation. Mainstreaming conservation and sustainable use of resources is a major approach UNDP adopts as part of its action. This book is an evidence of such work by creating concrete tools and approaches for biodiversity mainstreaming. Integrating biodiversity conservation into forestry sector is a specific milestone work that was defined and taken into action with great efforts. Of course, such a tool couldn't be realized without a sound partnership where we all managed to establish a working example of public, UN and civil society partnership. Besides, many experts form Government and academia have participated to this long engagement.

I believe, this unique example will be disseminated to other countries and regions as a best case and replicated. As UNDP Turkey, we will do our best to contribute to this target. Finally, I want to share my sincere thanks to Directorate General of Forestry, as the main body of conservation of forests in Turkey, and Nature Conservation Centre as well as all experts who have contributed to this particular work.

Claudio Tomasi
UNDP Turkey
Resident Representative

Foreword

The conventional nature conservation concept followed a paradigm based on species and protected areas. However, it is now realized that not only is this approach inadequate on its own but the effectiveness and contribution of these approaches to nature conservation are also being debated.

One of the contemporary global paradigms is the integration of the conservation approaches into studies of natural resource use and the practices of sectors benefitting from nature. For example, we can integrate conservation measures into forest management and implement practices that take into account the needs of species within a forest ecosystem and thus ensure the continuity of the ecological processes when conducting forestry activities. This integration is what sustainable natural resource management aims to achieve in this book. Although appealing as a concept, putting sustainable natural resource management into practice and achieving successful results is not an easy job. Extremely well-planned approaches, precise strategies, strong institutions, good experts, and skilled teams are needed.

The Directorate General of Forestry has taken significant steps toward sustainable natural resource management by transitioning to ecosystem-based, multi-functional planning since 2000. Multi-functional planning provides an opportunity to plan the benefits and services provided by forests apart from wood. It also provides a framework for accounting during the planning process for other potential sectors that have interactions with forest ecosystems. For the past ten years, DKM has been cooperating with the General Directorate of Forestry to develop methods for addressing biodiversity within this planning process.

This Planners' Guide is to be used for understanding how we can ensure biodiversity conservation while benefitting from forest commodities and values. The guide illustrates all planning and management processes through examples, starting from the inventory phase to the identification of practices required at the stand level.

There are many research activities, large-scale works, and individual field projects addressing the conservation of biodiversity. There are also many successful examples throughout the world; however, this study is one of the first examples in which conservation of biodiversity is systemized, institutionalized, and made an integrated part of forest management.

This product is the result of fruitful cooperation and joint works between scientists and forest managers. It is hoped that it will contribute to the sustainable management of Turkey's forests and will be an example for other forests in the world.

Chadwick Dearing Oliver
Nature Conservation Centre, Member of Science Committee
Yale School of Forestry and Environmental Studies, Global Institute of Sustainable Forestry

©Uğur Zeydanlı

Contents

Introduction

Perceiving forests as a whole ecosystem with the biological diversity and ecological processes they include has come to the forefront in recent years in Turkey, as in the world. Ecosystem-based functional planning is an effective tool in order to adopt an approach for planning and implementation in a way that this understanding requires. In Turkey, various approaches have been developed for nature protection function, which is one of the three pillars of ecosystem-based functional planning, and pilot implementations have been undertaken. In order for the approaches aiming to integrate biodiversity, which underlies the nature protection function, into forestry practices to be adopted in Turkey, it was better understood as a result of the case studies that the solutions produced have to be applicable and easy to disseminate.


©Uğur Zeydanlı

As can be seen in more detail further in the work, some pioneering studies on this issue were conducted in Turkey in the last ten years. The experience gained showed us how works related to the integration of biological diversity should be done and how they should not to be done. The key issues were:

i) Effect of constraints such as budget and time and developing approaches to overcome them,
ii) Biological diversity inputs (records) which are coded completely based on particular area to ensure their inclusion in the management plan,
iii) Biodiversity elements, of which relationship with forest ecosystem is clearly defined and which are selected according to their conservation priorities,
iv) Forestry practices which are tangible and scientifically determined for these elements.

As a result of the preliminary works carried out for an integration approach addressing these and other key issues, Integrating Biodiversity into Management Plans Guide has been created. The introduction of a multi-purpose, multi-criteria, functional planning approach played a key role in the creation of the integration process described in the guide. In this context, an approach including different layers of biodiversity was tried to be determined and methods suitable with it were tried to be developed. The main approach was to develop a method within the available resources (data infrastructure, human capacity, financial resources, time constraints) and the constraints on these opportunities. Each chapter of the guide has been formed as a result of literature data on the subject, contributions and opinions of expert academicians, interviews and workshops with the managers and engineers from the Directorate General of Forestry. The main objective of the guide is to provide a comprehensive and comprehensible guideline that describes an applicable integration approach with all its details. While creating this guide, within the available time and financial resources, it was tried to provide the most data to the teams that will perform the study, as well as to answer as many of the problems and questions as possible in advance, before the teams encounter them.

This guide will need to be updated and aligned with the new conditions as a result of developments such as the increase of resources allocated for the integration of biodiversity, the development of human capacity, the change of information on species with conservation priority and other elements of biological diversity.

Integration work has two pillars: planning and implementation. While this guideline describes the planning part, the second guideline provides recommendations on the general characteristics of species with conservation priority and other elements involved in the integration of biodiversity and forestry practices for them. This guide you are holding in your hand, describes the methods by which the data providing basis for the integration of biodiversity into forest management plans is collected and how this data help to identify the areas with nature protection function and what kind of implementations are suitable for them. The annexes of the Guide have brought together the information and documents that a Forest Directorate will need in the process of integrating biodiversity into the management plan. The second guide to be used during the realization of these works is the Practioner's Guide". In the Practioner's Guide, there are introductory pages revealing information about biodiversity elements with conservation priority and detailed assessment tables for forestry practices.

A quick look at the contents of the guide:

In Chapter One, general information about the integration of biological diversity into forestry practices and evaluations about previous studies are given. This chapter describes the approach adopted by this guide for integration. A summary of how the chapters of the guide should be used is also included in this chapter. As this section describes the process in general, it concerns all the different individuals and institutions involved in the integration of biodiversity into forest management plans.

In Chapters Two and Three, what the biodiversity elements with priority conservation to be evaluated within the scope of integration are and how to carry out the inventory related to them are explained. The team of experts who will plan and carry out inventories and the Forest Directorate, which will supervise the work will benefit from the content of these two chapters.

Chapter Four explains how to determine the distribution of biodiversity elements with conservation priority among Forest Directorates by using the inventory results and modeling methods. This chapter also provides information on methodological information required for the identification of conservation priority areas by assessing the distribution of biodiversity elements with conservation priority together and preparation of implementation prescriptions for limited implementation zones. At the end of the chapter, information on finalization of the identification process of conservation priority areas with the assessments to be made together with the Forest Directorate was given. This chapter is also for the use of the team of experts and the Forest Directorate.

Chapter Five provides guidance for the management committee who will prepare the management plan in conservation priority areas using the outputs of biodiversity studies. This chapter also includes information on how the management committee can classify the conservation priority areas identified according to their working group aims and how and in what ways they can make use of the outputs.

In Chapter Six, explanations on how biodiversity activities can be supervised by Forest Directorate are included. In addition, guidelines suggesting the supervision of whether the outputs of the biodiversity study were used and transferred to the management plan in the way it was required and to the extent required by the management committee by supervising and control chief engineers are provided.

In Chapter Seven, why and how the monitoring activities should be carried out in general terms, what kind of a work can be performed to monitor the practices for the conservation priority areas managed by Forest Sub-District Directorates of which management plans are renewed in accordance with the integration work and the experiences gained through monitoring works on this issue are included.

Chapter Eight includes the resources referred to in preparation of this guide.

Chapter Nine provides the documents to be used at different stages of the integration.

In order to ensure that this guide remains at a reasonable size, information on species with conservation priority and other elements of biodiversity are given in “Practioner’s Guide”, which is another guide. The team of experts, planners and supervisors should use this guide together with the Practioner’s Guide.

1.1 Inclusion of Biodiversity in Forest Management Planning and Practices

© Uğur Zeydanlı

Biodiversity is a concept that covers the diversity of living organisms, their habitats and processes that ensure the survival of the world. It is also referred to as the diversity of genetics, species and ecosystems and includes ecological processes, as well. Particularly since the beginning of the 20th century, the increasing number of human activities that are directly and indirectly destroying nature has affected biological diversity adversely. As in human activities in all areas such as industry, energy, transportation, urbanization, agriculture and mining, there have been practices in industrial forestry which also had negative effects on biodiversity. As biological diversity emerges as the source of all services provided by nature, the necessity of making human activities sustainable without harming the nature has been understood with the studies conducted and losses in nature, and conservation and natural resource management activities have been restructured in line with this principle.

A similar restructuring process is taking place in forestry. A new understanding of forestry, which regards forest as an ecosystem and tries to plan it by taking it over with all the elements it includes rather than regarding it only as a means to obtain wood as raw material and side sources and operating it only for such benefits, has become widespread in Turkey. The integration of biodiversity into forest management has also started to be discussed after this development. Different approaches to conservation of biodiversity, which has been an issue extensively discussed in the world since the early 1990s, can be adopted. The outstanding ones among them can be summarized as follows:

© Deniz Özüt

i) Compositional

This approach focuses on species that are an indicator of the structural status of the forest and the functioning of the forest ecosystem. In this approach, species and/or species groups called keystone, indicator or focus species are used (e.g. DeGraaf et al., 1992; Mills et al., 1993; Noss, 1999),

ii) Structural

This approach is based on the identification and conservation of the habitat diversity in forests. When these habitats are preserved, it is assumed that species living in these habitats and other elements of the forest are also protected (e.g. Köhl et al. 1998),

iii) Functional

Using planning and implementation methods in a way that the impact of operating the forest has on the forest structure becomes similar to the effects of natural processes (natural stand development, fire, flood, avalanche, insect infestation) (e.g. Bergeron and Harvey, 1997).

Which approach to be adopted is determined by many criteria such as the time and spatial scale of planning, the presence of available data, the allocated budget and human capacity. However, the ultimate goal should be to try to encompass all elements of biological diversity to the extent that the available resources allow.

To date, In Turkey, steps towards the integration of biodiversity into forest management plans have been taken with some case studies conducted (Forest Management Plans of İğneada, Camila, Yalnızçam, etc.). The plans of Forest Sub-District Directorates of İğneada (İstanbul), Bulanıkdere (İstanbul), Camili (Artvin) and Yukarı Gökdere (Isparta), some of which were also prepared under the project of GEF-II Biodiversity and Natural Resource Management Project, are among the steps taken. A forest management plan, into which biodiversity was integrated, was also prepared for Koprulu Canyon National Park (Antalya).

After these plans, biodiversity was integrated into the management plans of Forest Sub-District Directorates of Yalnızçam and Uğurlu (Erzurum) by adopting ETÇAP (Ecosystem-based Multipurpose Planning) approach; in other words, functional planning approach. This study was supported by the Environmental Investment Program of Baku-Tbilisi-Ceyhan Pipeline Company (BTC Co.). With the same support, biodiversity was integrated into the plans of the Forest Sub-District Directorates of Yusufeli and Altıparmak (Artvin) in 2010 and into the plans of Bayburt Forest Enterprise Directorate, where the approaches forming the basis for this guide were adopted.

With the support of Directorate General of Forestry, integration studies were carried out for the plans of Şavşat (2011) and Demirköy, İstanbul (2013) Forest Enterprise Directorates, and also, for the plans of Gümüşhane (2012) and Marmaris Forest Enterprise Directorates (2013) with the support of GEF SGP. By the end of the year 2014, works for integration started to be carried out in Köyceğiz, Pos, Andırın, Gazipaşa and Gülnar Forest Enterprise Directorates.

1.2. Integration Approach and Methodology

This study aims to develop the methods required for the integration of biodiversity into forest management plans and to create the data infrastructure which will allow the use of these methods in all forests operated in Turkey. The approach adopted is based on the assessment of species with conservation priority and other elements of biodiversity, which are among the biodiversity factors, on the level of Forest Enterprise Directorates. Methods for making an inventory of these factors, modelling their distribution, identifying their functions and developing forestry practices related to them are described, baseline data is presented, and a detailed working plan is provided.

An approach based on species works as a highly effective and comprehensible means used in both planning stage and in the implementation stage. Main advantages of an approach based on species are as follows:

i) Collecting data with ease: Species are the biodiversity factors on which the highest number of scientific studies are conducted, and useful data can be collected about them within a short time period.

ii) Representing other factors of biodiversity: Species represent the structure and functioning of the ecosystems they live in.

iii) Mapping with ease: Regional distribution of biodiversity can be clearly identified relying on the species through the use of distribution models.

iv) Integration into planning outputs (tables, maps etc.) with ease: The data on distribution of species can be easily integrated into the maps prepared for plans which are used as the main tool during implementation.

v) Perceptibility: Focusing on species makes implementation stage easier as they are the most basic biodiversity factors which can be explained to any people.

Oriental (Turkish) Sweetgum Tree (*Liquidambar orientalis*)
© Uğur Zeydanlı

However, one of the critical points for an approach based on species and elements is to find a concrete solution to reduce the number of species which is too high on a regional scale (for example on the scale of Forest Enterprise Directorate) by filtering to ensure they are workable in terms of their total number. The abundance of species means a workload challenge that can be hardly overcome during the planning stage while it also requires a work program that can never be followed due to the inability to meet the financial needs and inadequate human capacity during the implementation stage. At this point, **identification of species through prioritizing certain species** was preferred in this work as an objective approach to reducing the number of species considerably. During the prioritization process, a scale which is based on various criteria including the species' position to represent different functions of forest ecosystem and their status of being endangered was used to grade species. Another challenge of working with large number of species is the impossibility of collecting distribution data for plenty of species for the whole area while working according to the plans made for large areas. While distribution of some species can be identified with ease, most of them requires thorough inventories. The most objective method to cope with these difficulties is using the species distribution models. This method allows identification of the regional distribution of species based on limited amount of data and verification of the data. The maps laying out the distribution areas of species are the main source of spatial data to be used for the identification of the functions which will be included in the management plans and the conservation priority areas related to them. This spatial data can be used to define implementation plans on a large scale ranging from stands to conservation priority areas.

Besides the species, which form only one layer of the biological diversity, areas with critical importance, where the ongoing ecological processes between the groups of species and their environment come to the forefront, are also included in the integration work. Other elements of biodiversity, which are parts of the ecological processes forming the "setting and plot" of the play, in which species are "actors", are also covered in the integration work. These elements are the representatives of the habitats of the species, the relationships between the species and their habitats and structural and functional varieties of the ecosystems within the forests and those neighboring them. An integration that elaborates on these elements as well as the species with conservation priority would be able to cover the layered structure of biodiversity (genetic diversity, species diversity, ecosystem diversity, diversity of ecological and evolutionary processes) to a large extent.

Red Deer (*Dama dama*)
© **Ahmet Karataş**

1.2.1. Biodiversity Elements with Conservation Priority

Species with conservation priority and other elements of biodiversity (evolutionary / ecological processes) constitute the biodiversity elements with conservation priority to be used for the integration of biodiversity into forest management plans. Preliminary studies have been carried out in order to determine these elements at the level of enterprise directorates and to provide baseline data for the studies to be carried out on this subject. Information about what these studies are, and their outputs are summarized below.

1.2.1.1. Species with Conservation Priority

One of the elements that is going to be considered for the integration of biodiversity is the species with conservation priority. In this work, species with conservation priority is defined as follows:

Species with Conservation Priority:

It is the species that is dependent on forest and in need of conservation and the one for which the most effective conservation can be made by unit effort, while also having the potential to represent the biological diversity.

The impossibility of spatial planning and implementations for all the species in an area by making a list of them was previously mentioned in this guide. One way to overcome this challenge is to set realistic goals within the available financial, labor and capacity constraints and to direct the limited resources towards these goals. This is a key strategy adopted worldwide for the conservation of biodiversity. Thanks to this strategy, species with conservation priority are studied instead of studying all the species in an area. The method of selection of species with conservation priority should be objective, updateable and improvable in line with increasing opportunities.

Within the scope of this study, most of the data we have on species is compiled through using a scoring system. Large and small mammals, birds, reptiles, amphibians, butterflies, herbaceous and woody plants were the groups of species studied. All the information gathered about species and scorings were conducted by the experts of each group of species in Turkey. First, the current taxonomic lists of these groups of species have been established. These species were then placed in a priority order by scoring according to the criteria under four equally weighted categories. Species that scored above a certain score in the quantitative ranking have been identified as species with conservation priority. The scoring categories and criteria used for species with conservation priority selection were:

Category 1 – Dependency on Forest: The species that are dependent on forests the most will be those affected the most by forestry practices. The more a species is dependent on the forest, the more likely it is to be a priority species. Species with a high dependence on forests receive higher scores. Species that are not dependent on the forest at all are not considered.

Category 2 – Need for Conservation: It reveals how threatened the species is and therefore its need for protection. The species endangered to a greater extent need more conservation than other species do, which results in a higher priority given to them. For this category, species are scored according to three different criteria:

- IUCN National Red List: National Red List Categories of Threatened Species which are specific to Turkey is used. Species with higher threats score higher.
- Endemicity: It is checked whether the species is endemic or regional endemic and endemic species are given higher scores.
- Special habitat: Check whether the species needs a special habitat. Species that need special habitats are more sensitive and need more protection. These species get higher scores.

White-backed woodpecker
(*Dendrocopos leucotos*)
© Ömer Necipoğlu

Category 3 – Preservability: This category reveals whether there are certain characteristics, specific to a species which will facilitate conservation of the species. Species with these characteristics are more conservable than others. The features that facilitate conservation of the species come to the forefront in situations where limited facilities should be used in the most efficient way. Preservability was scored based on three criteria:

Laurus nobilis
© Uğur Zeydanlı

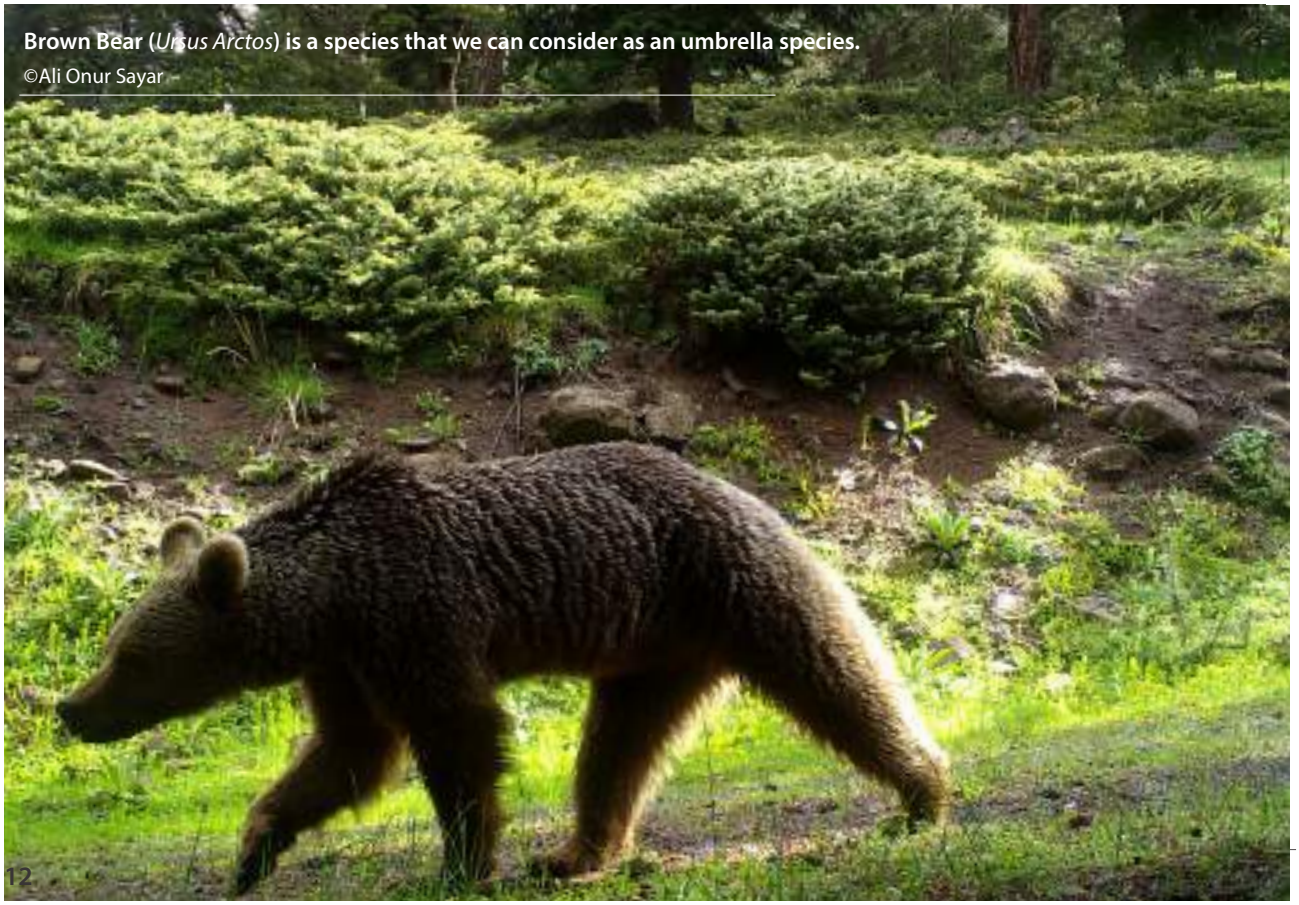
- Financial Gain: It is checked whether the species has an economic return. Resources can be mobilized more easily to conserve species offering financial gains. Such species get higher scores (for example: some types of sage)
- Flagship species: It is checked whether the species has a feature that makes them loved by the people or the implementers. This can be a cultural value or a sacred value. Since flagship species have such features, attracting people's attention and support to the works which are going to be carried out in order to conserve them. Flagship species are given higher scores. (for example: some type of orchids).

This hawthorn species specific to Ardanuç can be considered as a flag species for this district.
© Uğur Zeydanlı

- Simplicity of Inventory: It is checked whether the inventory of the species can be made effortlessly. More adequate data on the species of which inventory is easier than the other species can be collected with limited time and money. Furthermore, the effect of the works carried out on the status of the species can be monitored more realistically. The species that require relatively less effort for inventory get higher scores. Some species of which inventory is challenging (species that require a long time to collect data or those which are difficult to be identified) are not assessed. (For example: species like Dravskia, which are difficult to be identified and those living in small numbers therefore difficult to be located)

Category 4 – Representing Biodiversity: The more species, ecological processes or habitats that can be protected by the implementations and conservation works made for one species, the greater the potential of this species to represent biodiversity is. In this context, "keystone species" and "umbrella species" stand out:

- Keystone Species: They have a disproportionately high impact on the ecosystem in which they live when their density in the ecosystem is considered (such as the number of individuals, population size, biomass). With these effects, keystone species significantly affect the number and composition of species in the ecosystem of which they are a part of (e.g. Wolf).
- Umbrella Species: The conservation of these species ensures the conservation of ecosystems of many other species since they live/exist in many ecosystems or need large habitats. (e.g. Black Vulture)



Brown Bear (*Ursus Arctos*) is a species that we can consider as an umbrella species.
©Ali Onur Sayar

Species associated with forest ecosystem in Turkey, which are large and small mammals, birds, plants, reptiles, amphibians and butterflies, were first assessed and then scored based on the criteria described under each category. Scoring and assessment were carried out by academicians who are experts on groups of species. The species that scored above the average were defined as species with conservation priority.

Some prerequisites were defined for the species assessed due to their special conditions. In line with this,

- birds which are known to breed only in Turkey are assessed.
- Regarding the plants:
  - Endemic or regional endemic woody plants or all species and sub-species identified in IUCNN red list of threatened species by country as CR (critical), EN (endangered) and VU (vulnerable) were assessed.
  - Among herbaceous plants, all the species and subspecies defined as DD (Data Deficient), EN and CR were assessed.
- From mammals, bats could not be included in the assessment due to data deficiency. The remaining groups were assessed.
- Regarding butterflies, those which are defined as NA (not applicable) in the IUCN national category were not scored.

Species that are not dependent on forests and species that are very difficult to inventory were included in the assessment, but those which have at least one of these two conditions were not included in the scoring. Thus, for example, a species that is highly threatened but not dependent on the forest, or a species which is also threatened and dependent on the forest, but which is very difficult to inventory, are not included.

Table 1 shows the species groups used to identify species with conservation priority, the number of species assessed (terrestrial species with adequate data and scored in them, and the number of species with conservation priority identified as a result of scoring. The table listing the conservation priority forest species identified for integration studies is given in ANNEX 7.

Table 1. Identification of species with conservation priority.

Species Group	Number of Species in Turkey*[1]	Number of Species Assessed and Scored*	Number of Conservation Priority Species
Large Mammals	21	18	9
Small Mammals	120	41	5
Birds	485	133	7
Butterflies	415	114	7
Reptiles	131	103	3
Amphibians	32	31	7
Plants	11,738	286	80
TOTAL	12,942	726	118

*[1]: The number of species were last updated by the end of 2018 (Krystufek and Vohralik (2009) was referred to for the number of large mammal species and large land mammals were included in the calculation. The number of small mammal species was cited from Yiğit et al., 2006, 2016; Kryštufek and Vohralík 2001, 2005, 2009; Furman et al. 2010; Arslan and Zima 2014; the number of birds from www.trakus.org website; the number of butterflies from www.trakel.org website; reptile and amphibians from www.turkherptil.org website; and plants from Güner and others. 2012. Subspecies were also included in the assessment.)

Following this, the current distribution of species with conservation priority in Turkey was identified and "Species with Conservation Priority Lists" concerning Regional Directorates of Forestry and Forest Enterprise Directorates were created. ANNEX 8 provides the names of these species. Other than the species listed, Enterprise Directorate may add new species into these lists. While identifying species to be added into the species with conservation priority lists:

- Conservation priority sites defined through Systematic Conservation Planning (gap analysis), important "forest species" living in Important Nature Areas (INA), Important Plant Areas (IPA), Important Bird Areas (IBA) and Priority Butterfly Areas (PBA) completely or partly within the borders of the enterprise.
- "Forest species" which have distribution in the Enterprise Directorate and are overly picked off or under pressure due to their economic value or local utilization.
- Rare and endangered forest species found to be present during the field inventory works carried out in the enterprise and deemed necessary to be protected can be also included in the assessment, although they are not included in the species with conservation priority list.

Caucasian festoon (*Zerynthia caucasica*) butterfly is among Priority Conservation Areas for Butterflies species

Hence, it is noteworthy that the number of species with conservation priority does not exceed a total of 15 and a list including species with conservation priority from every species group is created within the bounds of possibility, since the number of priority species which are going to be subject to integration will affect the cost incurred by the work carried out.

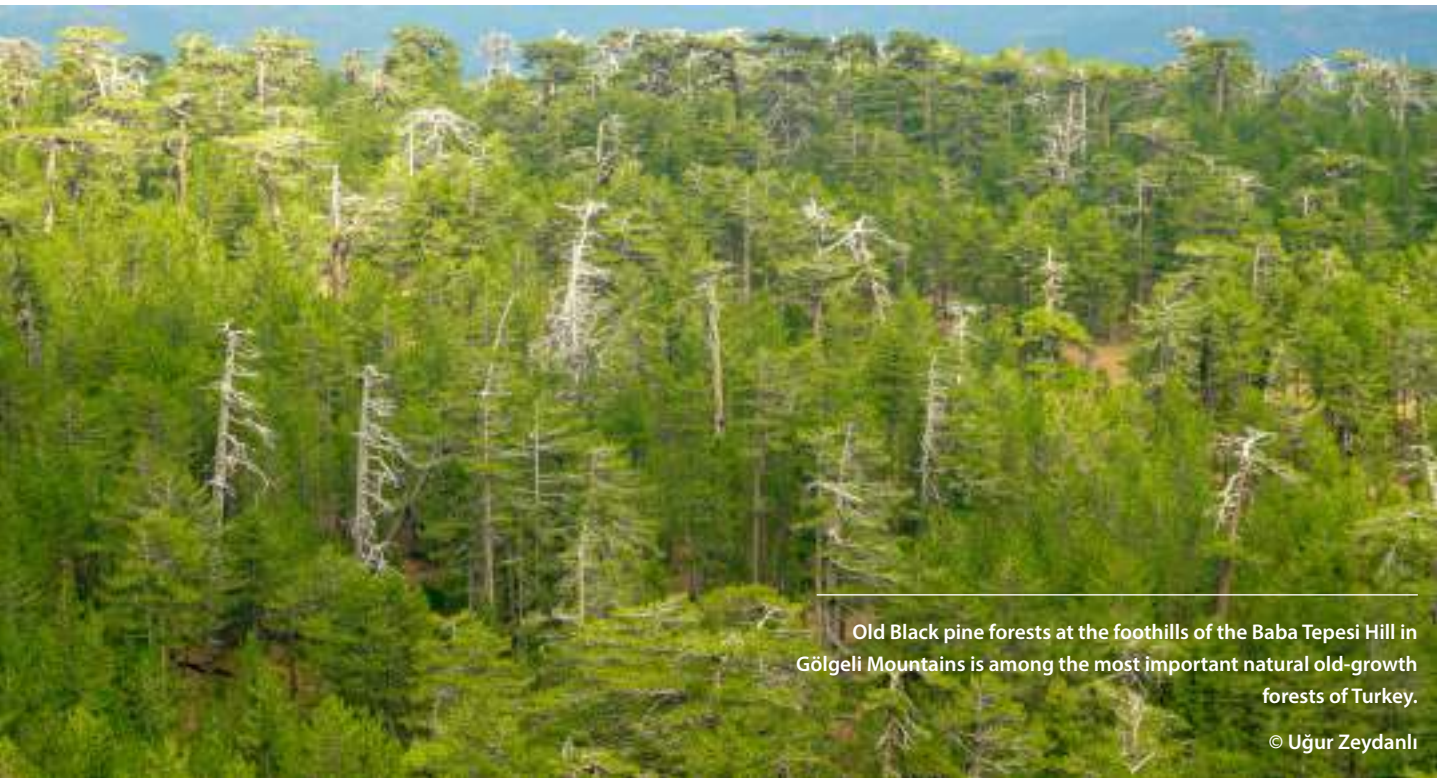
Pages presenting descriptions of species with conservation priority have been prepared in order to be referred to during the biodiversity work and the management work to be carried out in the conservation priority areas defined by this study. These pages can be found in the "Practitioner's Guide" which is going to be used with this guide. These pages introducing the species with conservation priority, provide information on habitat preferences, critical periods (reproduction, hibernation) and some other biological characteristics of the species, as well as the most suitable inventory methods and forestry practices for them.

1.2.1.2 Other Elements of Biodiversity

Ensuring the sustainability of forest ecosystems is the fundamental principle of forestry. However, sustainability of forest ecosystems relies on ecological processes and relationships, as in all other types of ecosystems. The existence of agents and factors guarantees a healthy ecosystem, which can renew itself. Besides, some processes, themselves, come to the foreground as biodiversity values. For this reason, it is essential to include these elements in forest management, as well.

To this end, forest establishments which are the spatial reflections of ecological processes or formed through these processes were included in the integration as "other elements". In addition to species with conservation priority, other elements of biodiversity studied for the integration are provided below:

i) Natural old-growth forests: Forests which were formed mainly due to natural/ecological processes, therefore having the characteristic of natural old-growth forest, are home to a distinct biodiversity compared to other forest areas.



Old Black pine forests at the foothills of the Baba Tepesi Hill in Gölgeli Mountains is among the most important natural old-growth forests of Turkey.

© Uğur Zeydanlı

ii) Species-rich forest areas: A forest's being rich in tree species can be considered as an indicator of biodiversity within the forest ecosystem, as well as a representative for ecological processes. Areas rich in tree species are also considered rich in terms of ecological processes.

Western Black Sea forests are rich in woody species.

© Uğur Zeydanlı

iii) Stands varying in terms of tree species composition: The composition of the tree species forming the forest vegetation is in constant change due to physical and biological conditions. Nevertheless, it is possible to identify some formations repeating themselves, even during this dynamic and changeful process. Areas home to different species mixtures rather than the widely observed forest compositions on regional scale, should be treated as a biodiversity element created by ecological processes.

The Eastern Black Sea Oak, which forms a mixture with beech and hornbeam, can be considered as stand with different composition since it can form a population in very few places.

© Uğur Zeydanlı

iv) Large forest blocks and connecting corridors: Forest areas with this characteristic are one of the essential elements providing species richness, sustainability of species and richness of ecological processes. For this reason, the whole and intact forest blocks, and forest parts establishing the connection between these blocks within our area should be considered as a significant value, as well.

© Uğur Zeydanlı

v) Marginal populations: A tree species may have populations succeeded in forming colonies in areas with different ecological conditions, which may be considered as marginal for that tree species. These populations exist as a result of their genetical transformation from other populations of the same species due to environmental conditions and ecological processes. These marginal populations are an important component of the genetical variability of that species owing to their unique gene pool.

Beech forests, which make one of the southernmost spread in the Black Sea region, can be considered as marginal population because of their continuity with other beech forests.

© Didem Ambarlı

vi) Forests with special microclimate: Microclimates with different structures and functions develop inside the forest areas, especially at valley bottoms, in ecosystems of rocky areas and caverns, or they develop due to other local climatic characteristics. Microclimates, which can be considered as important elements of ecological processes, enhance biodiversity by supporting the formation of forest parts adapted to the said areas.

Depending on the presence of water in the Mediterranean, sycamore, oleander, elm, hedgehog and some other shrubs form a different population among Turkish pine forests and maquis.
© Uğur Zeydanlı

vii) Relict-enclave ecosystems: Relict-enclave forest ecosystems are the reflections of the changes that the vegetation went through due to the climate change occurred during the geologic ages. During the warming - cooling periods in geological times, the vegetation of the northern zone extended towards the southern latitudes and the vegetation of the southern zone extended towards the northern latitudes and withdrew. As a result of this process, in some protected valleys, where the oil and moisture conditions are suitable, vegetation that is not original to that zone has been conserved to date. Such relict-enclave ecosystems are also spatial reflections of ecological processes.

The beech forests in Adana and Amonos Mountains show an unrelated distribution from the other beech forests spreading in the Black Sea region. This vegetation, which descended to the south as a result of cooling during the glacial period, can be considered as a relict-enclave forest ecosystem as it can survive in this region.
© Uğur Zeydanlı

viii) Water sources and peatlands in forest: Although terrestrial ecosystems dominate a significantly large area on the world's surface, their sustainability depends on the relationships they have with the aquatic ecosystems. The cycle of many elements in terrestrial ecosystems and their transfer within the ecosystem depends on aquatic ecosystems. Again, the movement and spread of many species take place through the valleys. Movements and habitat changes of species as part of their evolutionary processes take place along the valleys, as well as ecological processes. Therefore, for the sustainability of forest ecosystems, it is very important to protect the aquatic ecosystems in the area, to ensure that they are affected least by forestry activities and to protect them against other factors.

There are many other elements forming the ecological processes or formed by them other than the elements mentioned above. They are various and mountain forests, wildlife corridors, special biogeographic regions where different climatic regions intersect and areas with certain bedrocks are examples for them. However, elements with certain priorities are included in the study since limited sources (labor force, time, budget) are going to be used for integration.

1.2.2 Phases of Integration

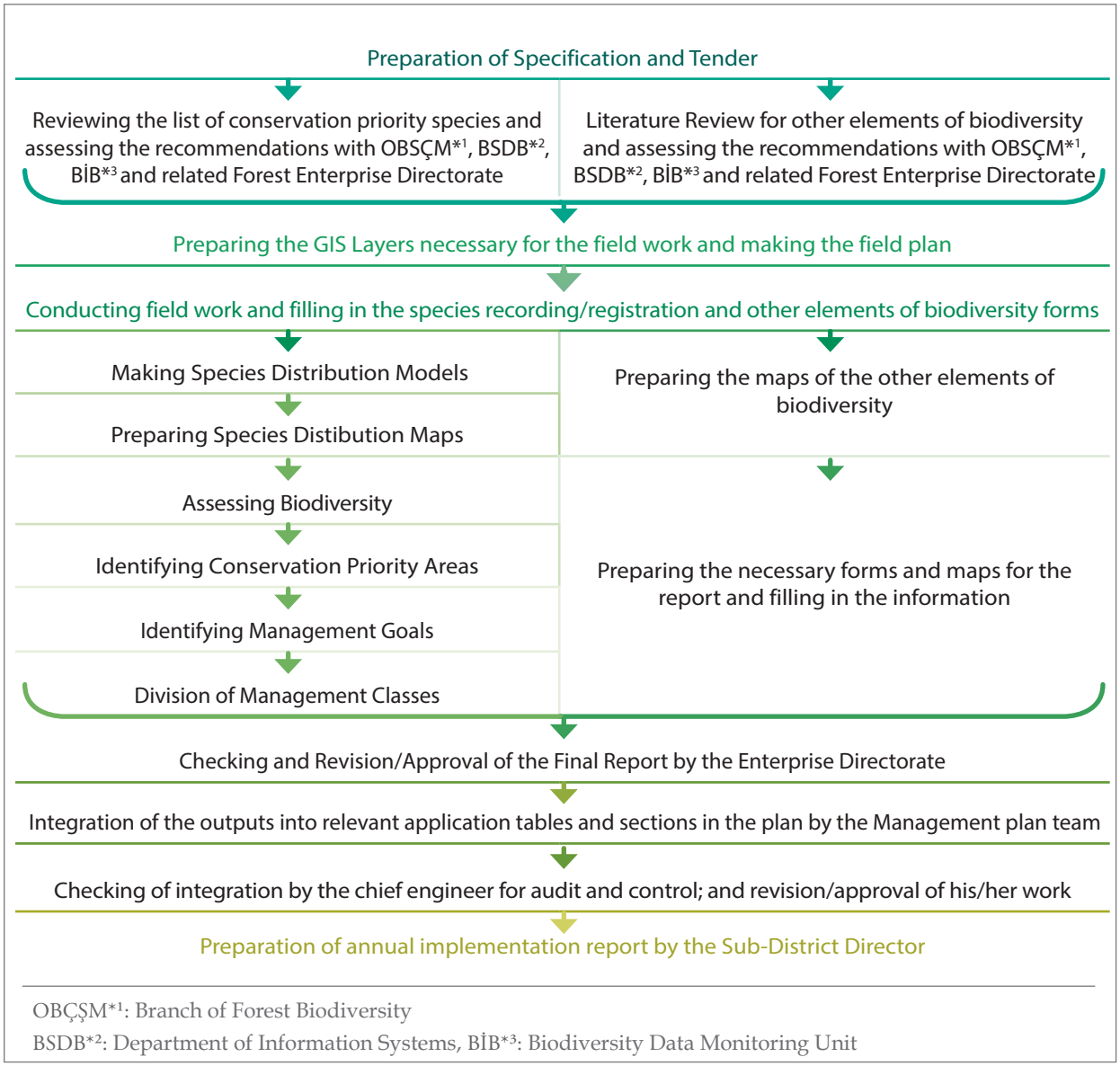
In order to realize the integration of biodiversity into forest management plans, inventory, analysis and modeling studies should be conducted for species with conservation priority and other elements of biodiversity at least one year before the management plan is prepared in each Enterprise Directorate. Some of the base data required for these works are presented in this guide and the annexes to it. What other data is required and how to access it is also stated in the relevant parts of the guide. In addition, it was tried to be explained in detail how, by whom and in which way the work will be done. It is important that the methods described and recommended in the guide be adopted and used by experts so that the integration work is carried out in integration and with minimum loss of time.

Phases of the integration of biodiversity can be summarized as follows (Figure 1):

1. GDF adds the budget item of "integration of biodiversity" into "management plan renewal budget" of Forest Enterprise Directorates, of which management plans have expired and will be renewed and subsidizes the work.
2. The related Enterprise Directorate which aims to conduct a study for the integration of biodiversity reviews the species with conservation priority list attached in the annex to this guide and identifies other species to be added into the list and reports them to GDF head office for approval.
3. The Enterprise Directorate subsidized for the integration of biodiversity goes out to tender by using Table 16 work tracking form provided under Chapter 6.1. as draft, at the beginning of the year in which it is subsidized and decides on the team of experts who will carry out the work.
4. The team of experts contact the team of experts who have already completed the works given in this guide successfully and exchange experience.
5. Enterprise Directorate provides the team of experts with the necessary digital maps and printed materials:
   - "Documents to be Used by Team of Experts" attached to this guide (ANNEX 1 – ANNEX 6)
   - Planner's Guide (this guide)
   - Practitioner's Guide
   - The most recent digital stand maps, topographic maps and the maps showing the areas with conservation status concerning the Enterprise Directorate where the work will be carried out and the neighboring Sub-District Directorates
6. The team of Experts makes the inventory of species with conservation priority and other elements of biodiversity to identify conservation priority areas (strict conservation and limited implementation zones) and submits them to the Enterprise Directorate for approval.
7. The Forest Enterprise Directorate reviews the results and finalizes the outputs in a meeting with the team of experts, following which outputs are checked to see whether they are suitable for being integrated into management plan and approved.

8. In the following year, the management committee which will prepare the management plan transfers the practices to be carried out in the areas defined as conservation priority areas to the relevant application tables and sections in the plan by using the biodiversity assessment outcome report with the annexes to it, written for the integration of biodiversity.
9. Management chief engineers for audit and control inspect whether the integration of biodiversity is carried out properly under the management plan.
10. Sub-District Directors carry out the practices recommended and included in the management plan while following the plan and report the applications annually.

Figure 1. Phases of Integration



OBÇŞM*1: Branch of Forest Biodiversity
BSDB*2: Department of Information Systems, BİB*3: Biodiversity Data Monitoring Unit

1.3. Using the Guide

Prepared for the integration of biological diversity into forest management plans, this guide has been written for the individuals and institutions that will carry out the different phases of integration works. Reading the entire guide will be useful to see how the methods, tools, and information provided in the guide complement each other and the stages through which biodiversity is integrated into the management plan and transformed into a concrete output. The people and institutions responsible for the works can refer to the relevant parts of the guide in order to carry out their share of the work and obtain the information required for the work they need to do. For this purpose, **Table 2** provides a summary showing which chapters can be used by whom and phases of an integration work in form of work-input-output.

This guide gives information about

- the conservation priority biodiversity elements,
- the data to be produced by the inventory of them and how this data can be produced,
- how this data produced will be used for the integration of biodiversity into management plan,
- monitoring to be carried out to track the implementations for conservation priority biodiversity elements.

Information Provided in the Guide and Annexes to it About the Methods to be Used in Integration Work:

1. "Species with Conservation Priority List" specifying the names of the species with conservation priority found in the Enterprise Directorates,
2. The digital maps required for the planning and conduction of the inventory of the species with conservation priority, the inventory method to be used in the field, forms and their descriptions to be used during the inventory, information and forms for the report where the outcomes of the inventory will be collected,
3. A chapter giving information about other elements of biodiversity and describing how inventory of them will be made and how the data obtained will be analyzed,
4. The digital maps required for the planning and conduction of the inventory of other elements of biodiversity, descriptions of the methods to be used in the field and of assessment, information for the report where the outcomes of the field work will be collected,
5. Information about location data obtained through the inventory of species with conservation priority and about the modelling method to be used to convert other data into species distribution map,
6. Information about identifying conservation priority areas by gathering distribution of species with conservation priority and the areas of the other elements of biodiversity in order to interpret them,
7. Information about how to determine functions of conservation priority areas,
8. Spatial distribution of conservation priority areas and biodiversity elements, descriptions to instruct on how to prepare the plan by using the data on these and base maps,
9. Information about determining the content of forestry practices to be recruited in conservation priority areas,
10. Information about checking the forestry practices to see whether they are accurate and proper in terms of their content,
11. Information to facilitate the checking of the work carried out, by Enterprise Directorates fully and on time.
12. Instructive information to be used in transferring the outputs into the management plan.

Table 2. Table showing which chapter of the guide is for whom (color codes) and which works, inputs and outputs are in which chapter (GIS: Geographic Information System, BD: Biodiversity, OEB: Other Element(s) of Biodiversity).

	Chapters in the Guide					
	2. Inventory of Species with Conservation Priority	3. Identifying Other Elements of Biodiversity and Their Inventory	4. Analysis of Biodiversity Data	5. Using Biodiversity Outputs in Forest Management Planning	6. Auditing of Works	7. Monitoring of Practices
WORK	Planning Field work	GIS Analysis Interviews – Meeting Field work	Modeling Draft Zoning Mapping Assessment of Zones	Transferring BD Output to the Plan Supervision of OEB Integration Plan	Auditing of Works Assessment of the Outputs Inspection of BD Integrated Plan	Monitoring Plan Implementations Monitoring Species with Conservation Priority and Elements
INPUT	List of Species with Conservation Priority Species with Conservation Priority Data	Data on OEB	Species Data OEB Areas	Species with Conservation Priority Data OEB Data BD Final Report	Final Reports of Species and OEB Final Report of BD BD Integrated Management Plan	Management Plan Monitoring Plan
OUTPUT	Species Data Final Report of Species Inventory	OEB Areas Final Report of Inventory of OEB	Distribution Areas of Species with Conservation Priority Map of Zones BD Final Report	Plans of Conservation Priority Areas Implementations in Conservation Priority Areas	Management Plan into Which BD is integrated	Annual Report on the Implementation of Management Plans – Table 35

Integration Project Team
Integration Guides
Enterprise Directorate
Management Committee
Management Audit and Control Chief Engineer
Branch of Follow-up and Control

2. Inventory of Conservation Priority Species

Inventory of the species with conservation priority in Enterprise Directorates will be made in order that to integrate biodiversity into forest management plans. The purpose of the inventory of each species with conservation priority is to collect data on the spots/points where the species with conservation priority is present. To this end, it is essential to collect literature data, locate the species with conservation priority through the field work and sample all types of possible vegetation/habitat. This data will be used to identify suitable distribution of the species with conservation priority in the Enterprise Directorate.

The aim of the works carried out in order to make the inventory of species is to list the species found mostly within the borders of that region or sometimes record certain locations where these species are detected. The inventories that are going to be made are not inventories of species biodiversity, but inventories of presence (presence records of the species) which will be used to reveal the distribution of species with conservation priority identified. Under this work, distribution modellings of species will be done by using data from the inventory of presence which will be collected in form of spot recordings and data on ecological needs of the species (see Chapter 4). Following the modelling, areas suitable for the distribution of species with conservation priority found within the borders of the Forest Enterprise will be identified and species distribution maps will be created.

Species with conservation priority that will represent the flora and fauna in the area were identified for each Enterprise Directorate in order to make most of the limited labor and financial sources. Conservation Priority List (ANNEX 8) concerning the related Enterprise Directorate of which plan will be prepared can be referred to in order to decide on which species to be inventoried and which experts are needed.

Works for the inventory of presence will be planned and conducted by species group experts in order to reveal the distribution of the species with conservation priority in the Enterprise Directorate. Experts can benefit from the Annexes to this guide and Practitioner's Guide in order to plan and carry out the inventory.

Works for the inventory are conducted in two phases. In the first phase, species group expert works in collaboration with the modelling expert and works out a daily plan for the inventory he/she will carry out in the Enterprise Directorate. What stands out as a critical point here is ensuring all the areas where the species with conservation priority can be found within the borders of the Enterprise Directorate. The work that the species group expert will carry out with the modelling expert includes mapping the areas where the species with conservation priority may be found within the borders of the Enterprise Directorate and working out a daily plan for the field work in order to visit the right spots shown on the map, considering the path networks. Accordingly, the expert prepares species inventory plan and presents it to the Enterprise Directorate in form of a report (see ANNEX 2). The Enterprise Directorate reviews the report and approves its appropriateness. The Enterprise Directorate informs the local law enforcement officers on duty in the area and other units responsible for protection (e.g. Local Office of Nature Protection and National Parks) about the work included in the inventory plan in order to make sure the operations and the people working in the site are safe.

In the second phase, field work is carried out by the species group experts as provided in the inventory plan. The data obtained is gathered in form of final/outcome report of species inventory (see ANNEX 3) and submitted to the Enterprise Directorate.

Data and assessments to be included in the inventory report will be used by modelling expert in the following step, the identification of conservation priority areas. For this reason, final report of the species inventory should be written according to the technical content and format specified in the form in ANNEX 3.

2.1. Planning the Inventory

The most limiting factor in the field works carried out for the species with conservation priority under the integration is time. It is of great importance to plan the inventory in order to make most of the time allowed and collect data suitable for use in modelling within this time period.

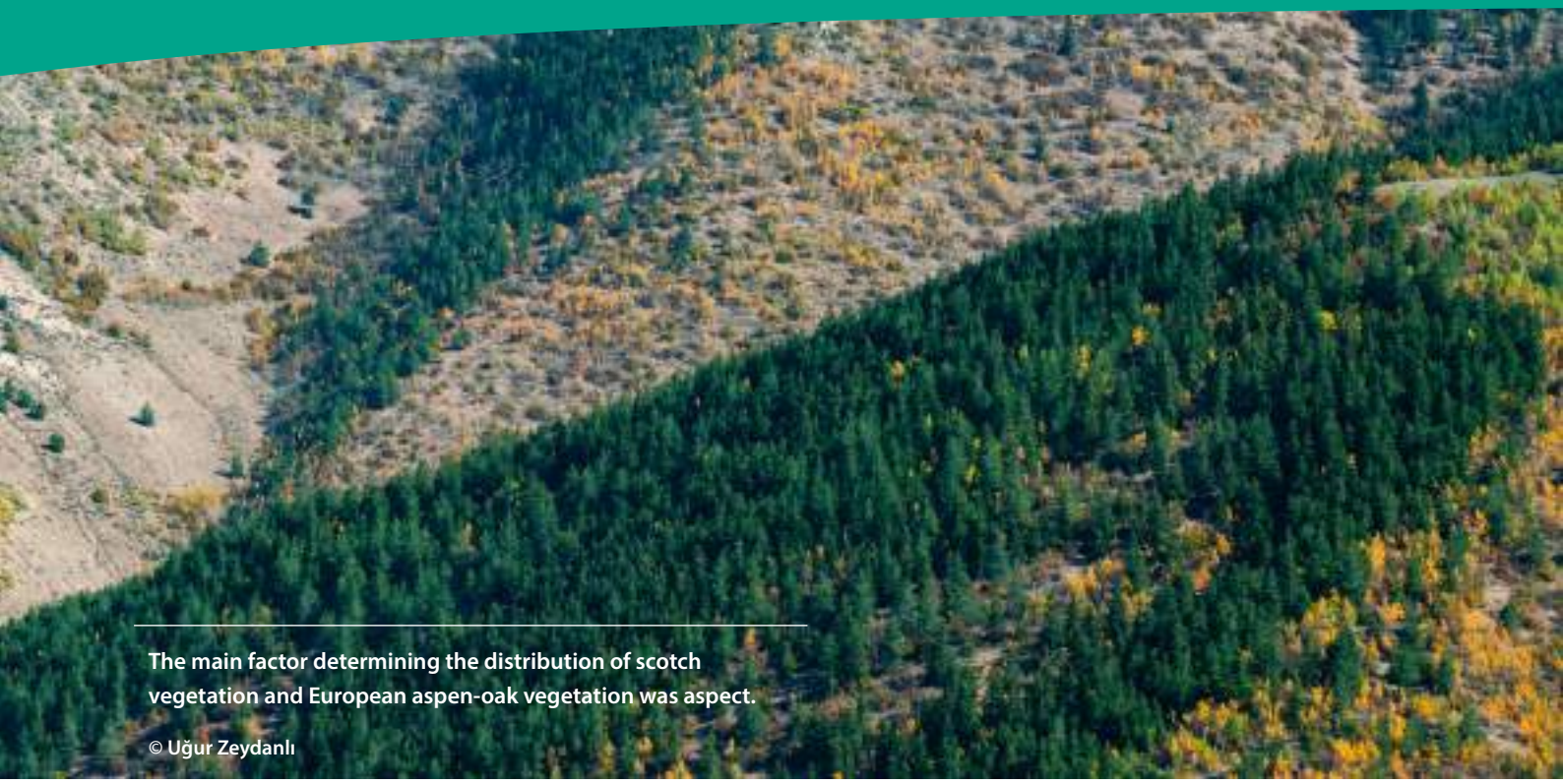
Daily field work program should be created before visiting the field by studying on the map of the area in order to complete the sampling of the species with conservation priority in the field quickly.

Species with conservation priority from six species groups (large mammals, small mammals, birds, reptile-amphibians, butterflies, plants) were chosen for integration. Inventory planning and the inventory following it will be carried out by the expert of that species with conservation priority group and a modelling expert, separately for each species with conservation priority. It is enough to work with one expert for more than one species with conservation priority from the same species group (e.g. bird species group, large mammal species group). The number of field visit days determined for the inventory is about 5-10 days for each species group, which is a short period of time. In this period, it is required to study a large area like the whole area of the Enterprise Directorate.

Within this short period of time, the areas where the species' presence is considered impossible within the borders of the Enterprise should be identified in order to collect the meaningful data which will be used for modelling before long. Following that, the species group expert and modelling expert make a map of the areas where the species may be found and create a daily field plan for the inventory considering the path network, by taking into account the habitat preferences of the species with conservation priority (see Practitioner's Guide, pages introducing species with conservation priority) and using digital geographic information systems (GIS) layers.

Second factor contributing to the collection of presence records of the species with conservation priority in the most efficient way is choosing the right period of the year to carry out the field work. The knowledge and experience of the species group experts have a major role in this respect. Besides, the pages introducing the species with conservation priority in the Practitioner's Guide will act as a beacon. The opinions of the experts in charge in the Enterprise Directorate should be definitely referred to regarding the local factors such as transportation, vegetation period and weather condition, which will affect the field work. After this analysis, the periods of the year suitable for conducting field work for each species with conservation priority should be chosen and the necessary preparations should be made to allow species group experts to carry out their field work in these periods.

The steps to follow for the preparation of inventory plan are provided below in order. Following the completion of the works in these steps, the inventory plan to be used during the inventory is prepared and the field works are conducted in accordance with this plan.



The main factor determining the distribution of scotch vegetation and European aspen-oak vegetation was aspect.

© Uğur Zeydanlı

2.1.1. Preparing Digital Map Layers

Digital maps of the Enterprise area is used to identify the sampling areas. Digital maps to be used for the work:

1. Vegetation maps: Map of Vegetation types is either map of stands or global ground cover (GlobCover: http://ionia1.esrin.esa.int/).
2. Topographic maps: These are the maps showing data on altitude and digital elevation model called DEM.
3. Hydrology map: It includes streams, lake and wetlands located in the area.
4. Settlement and road network map: Such maps show the settlements and roads in the area and classify them based on their types.
5. Map of protected areas: Such maps show certain protected areas where forestry practices are either never done or done limitedly (national park, nature reserve area).
6. Map of important species areas: This map shows Important Plant Areas, Important Bird Areas, Priority Butterfly Areas and Important Nature Areas, which were defined through the studies conducted by various non-governmental organizations and public institutions, as well as information relating to them.
7. Maps of systematic conservation planning: Maps showing the conservation priority areas (priority sites) produced by the systematic conservation planning carried out in Turkey on a regional scale (gap analysis), as well as information relating to them.

The digital map layers given above are prepared for the relevant area by the modelling expert. These maps will constitute some of the base digital maps which will be used for the inventory (and after that distribution modelling) of all species with conservation priority. Maps are provided by the related unit in GDF.

2.1.2. Identifying the Areas to Go to for the Inventory of Species with Conservation Priority

It is necessary to identify the areas where species with conservation priority to be studied in the field are likely to be found in advance and to make an inventory plan encompassing these areas, since the inventory targets species with conservation priority. At this point, species group experts and modelling expert work together on the digital maps prepared by the modelling expert so that they define the areas suitable for the inventory of each species with conservation priority in the enterprise. This is repeated for every species specified in the conservation priority list of the enterprise. The steps to take in order to identify inventory sites are as follows:

- Species group expert adopts an inventory method.

- The areas where the species with conservation priority is likely to be found are defined.

- Field works are planned.

2.1.2.1. Adoption of Inventory Method by the Species Group Expert

The species group expert, with the help of the species data page provided in the annex to the Practitioner's Guide, adopts an inventory method to use for the species with conservation priority he/she will study on. The purpose of the inventory is to locate the species with conservation priority and collect data about the spot it has been located (coordinates, habitat description etc.). What this data covers are provided in Species with Conservation Priority Inventory Forms in ANNEX 1.2. Forms were prepared in two different formats as fauna and flora. Throughout the field work, while trying to make records of species with conservation priority as many as possible is an aim, it is also of importance that the records have a distribution that can represent all the enterprise area.

2.1.2.2 Identifying the Areas Where the Species with Conservation Priority May Be Present

The areas where it is impossible for a species with conservation priority to live (if there are) in the Enterprise Directorate are identified and left out of the works in order to use the limited time allocated to the field work. Regarding the remaining areas, the areas with habitat characteristics that are preferred by the species with conservation priority are identified. To do this, GIS layers in hand are used. The species group expert identifies the habitat characteristics that are preferred by the species by using his/her own knowledge or the data provided in the species with conservation priority data page (see Practitioner's Guide). He/she then shares them with the modelling expert and the modelling expert chooses digital GIS layers, where he/she can identify the areas with these characteristics, with the species group expert. The modelling expert identifies the areas where it is possible for the species to live based on the information given by the species group expert by using GIS analysis. Small areas which do not meet the criterion of a certain size of area defined by the species group expert in advance are crossed out. The remaining areas are identified as areas where it is possible to find species with conservation priority. A general map of the areas suitable for the species within the borders of the Enterprise Directorate is produced by using these layers. An example to the stages of this work is given below.

Species with conservation priority: Lynx (*Lynx lynx)*

Habitat preferences (Identified by the species group expert): Although it lives in any coniferous forest, they would rather prefer degraded coniferous forests and/or those with a crown closure grade 1. Altitudes of 1000-2000 m.

GIS Layers Chosen (Chosen by modelling and species group expert):

Stand map, contour map

Criteria Defined for GIS Analysis (Chosen by modelling and species group expert):

1. Areas with an altitude of 1000-2000 meters (Figure 2).
2. Areas 500 meters far from the nearest settlement (Figure 3).
3. Coniferous forest areas (Figure 4).

Creation of Map (Done by modelling expert): The areas with buffers formed in the first three steps are intersected; so that both the areas with an altitude of 1000-2000 meters and those 500 meters far away from the settlements were chosen. They are then intersected with the layered coniferous trees (Figure 5).

Figure 2. Areas with an altitude of 1000-2000 meters

Figure 3. Areas 500 meters far away from the settlements

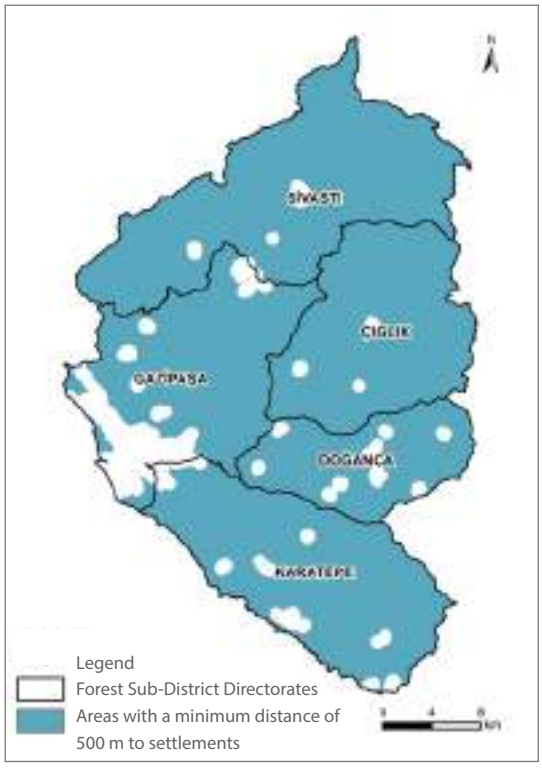


Figure 4. Coniferous forest areas.

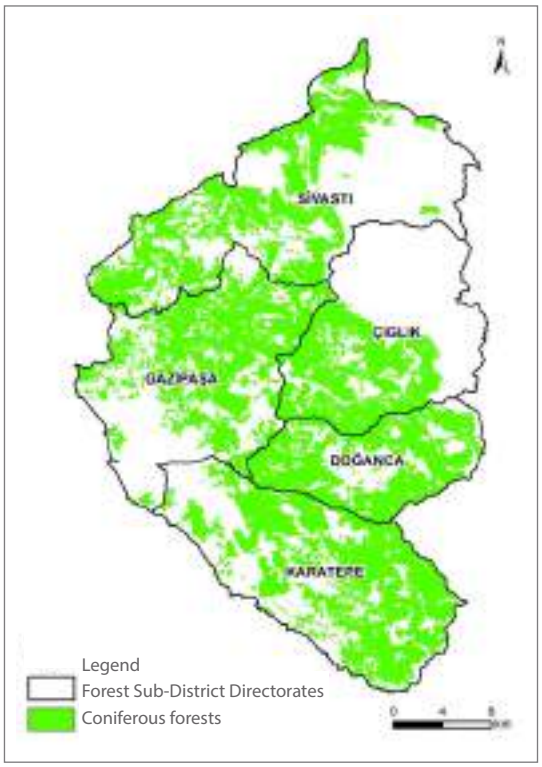
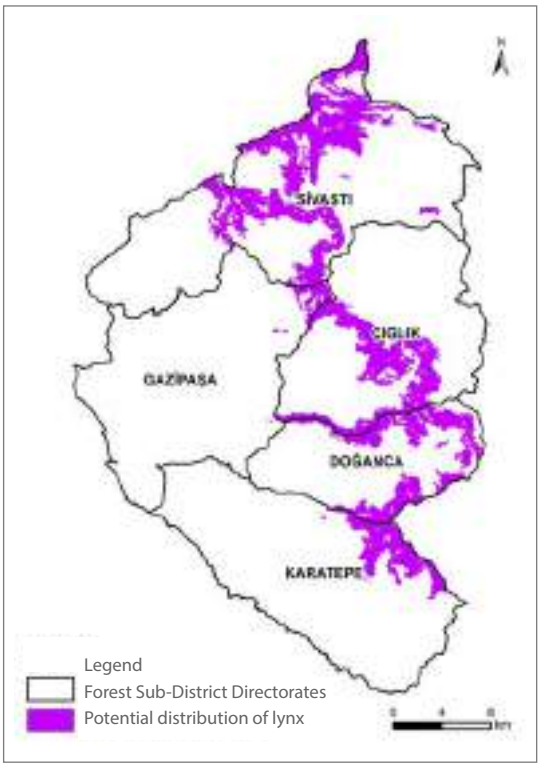


Figure 5. Altitude, distance to settlements and synthesis of coniferous forest layers



2.1.2.3. Planning the Fieldwork

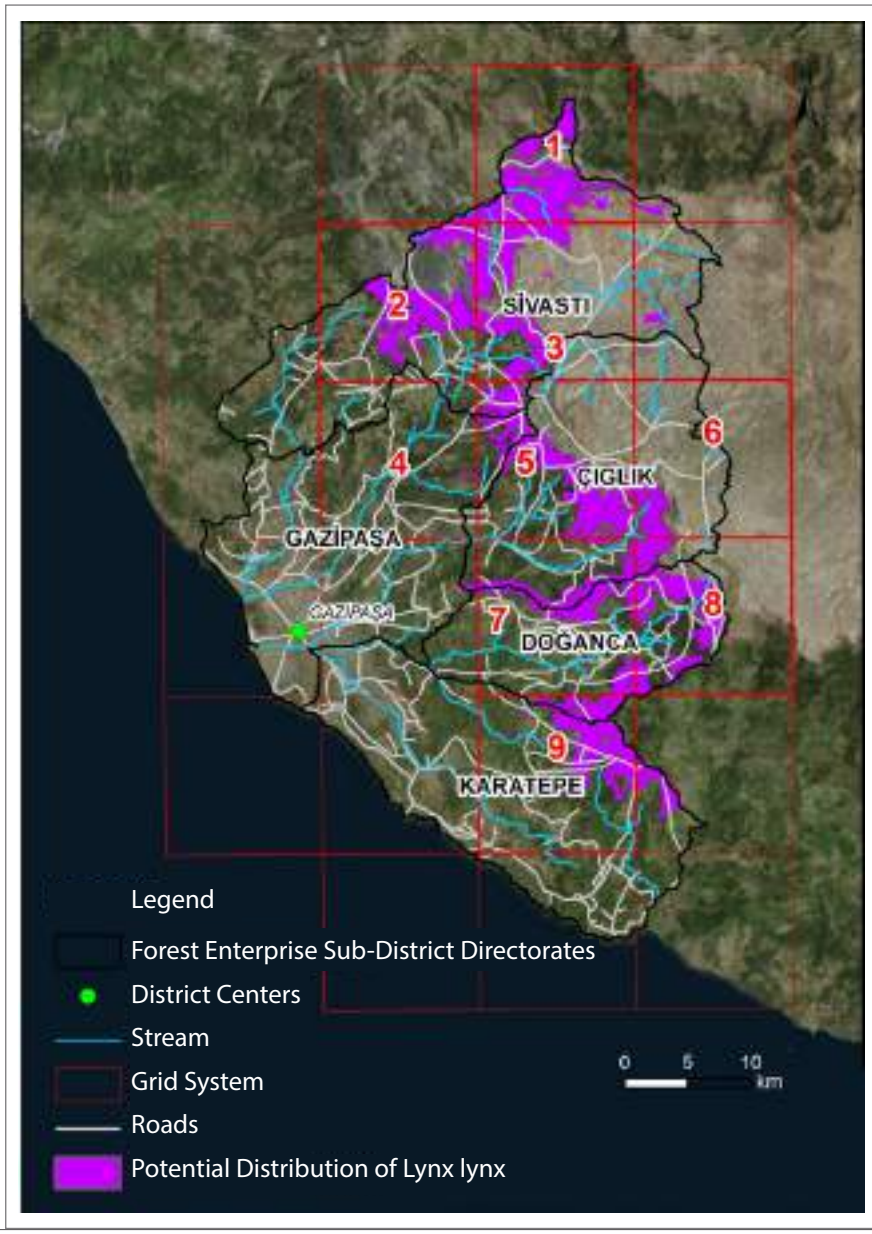
While planning the field work to be conducted in the suitable areas mapped in the previous step, areas are divided into sections in a way that each section can be visited in one day. Road network and topography will be determining factors for the division of the area into sections. The size of each section should be determined in a way that it is possible to visit them by vehicle in one day and to go into them on foot for sampling in certain areas. Therefore, the number of sections selected will be nearly equal to the number of days allocated to the field work. Hence, it is of importance that the sections to be visited have a proper distribution in the area of the Enterprise Directorate, which will allow visiting every separate section of the Enterprise Directorate. After these sections are defined, the borders for each are roughly defined and they are numbered, following which the days on which the field work will be conducted are determined. (Figure 6.)

© Can Bilgin

© Tarkan Yorulmaz

© Mecit Vural & İrem Tüfekçioğlu

Figure 6. An area divided into regions and numbered for field work



Wolf *(Canis lupus).*

Brown bear
(Ursus arctos)
© Ali Onur Sayar & Deniz Özüt

2.1.3 Working Out a Work Schedule for Inventories

There are two dimensions of the work schedule for the inventory work. One of them is about the period of the year to choose for the inventory of species with conservation priority. The second one is planning of the works in the field on the dates chosen for the inventory.

Which period of the year is most suitable for the inventory method adopted will be decided on and the inventory will be made in that period. Species introduction pages in the Practitioner's Guide will be also instructive, besides the knowledge and experience of the species group experts. The opinions of the experts in charge in the Enterprise Directorate should be definitely referred to regarding the local factors such as transportation, vegetation period and weather condition, which will affect the field work. The coordinator who coordinates the whole work (from the team of experts) defines this period and determine the days on which the field work will be carried out. Biodiversity work coordinator will finalize the time of these periods during which each expert will conduct field work by interviewing with all species group experts joining the work.

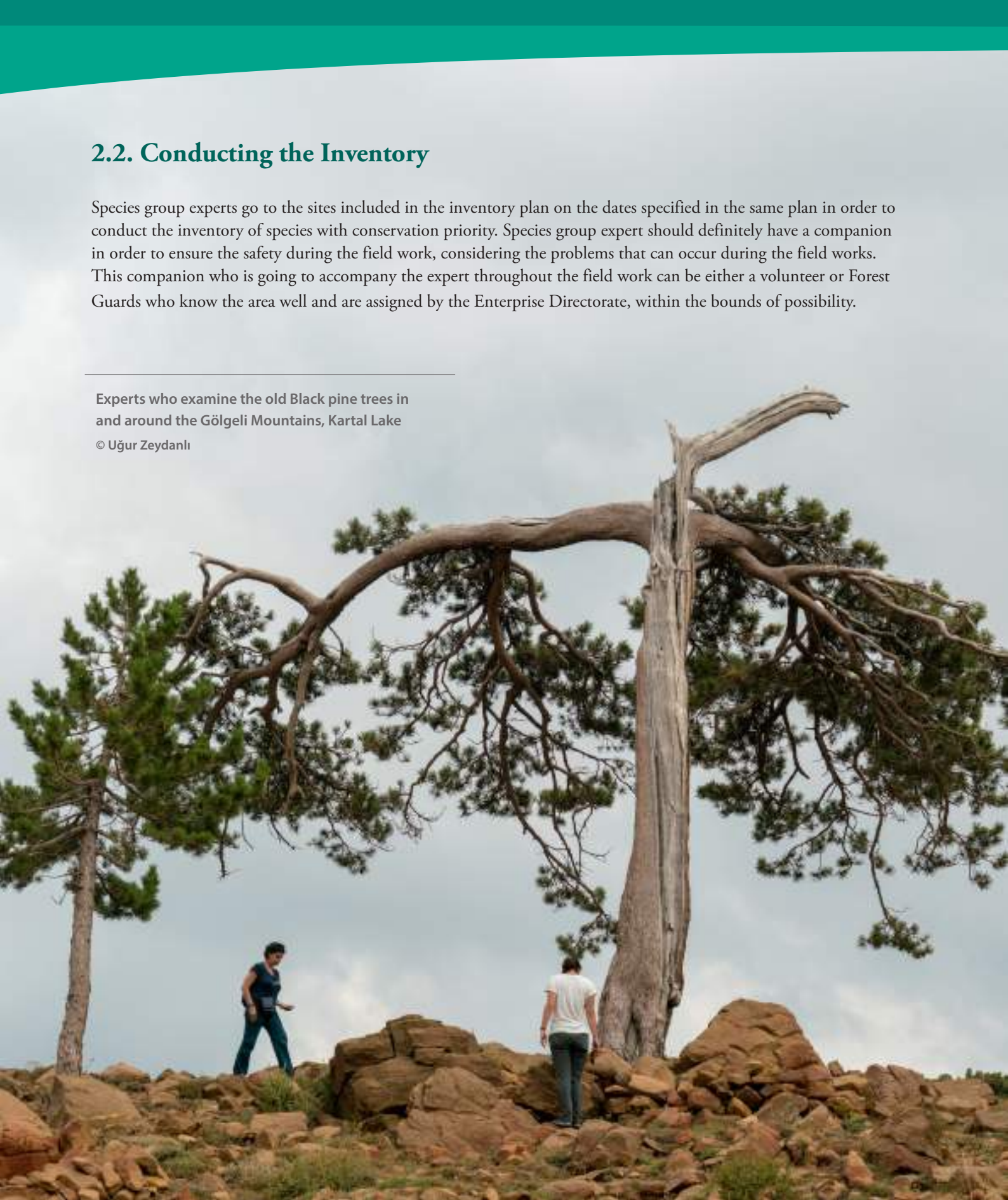
The explanations provided under 2.1.2.3 should be considered while preparing daily plan for the field work.

2.1.4. Schedule Report of Inventory

The sections where sampling will be done within the area of the Enterprise Directorate will be defined and daily work plan will be prepared, and they will be used to prepare the Species Inventory Planning Report provided in the ANNEX 2. This report includes the map of the sections to be visited, work plan and the description of the inventory/sampling method to be used. The report will be used to ensure proper conduction of the field works and allow the relevant Enterprise Directorate officers to track the works. The reports should be submitted to Enterprise Directorate at least two weeks before the field work start. After the Enterprise Directorate is given the report, it reviews the working plan and checks whether it is appropriate and reports its decision for approval accordingly. Besides, Enterprise Directorate informs the local law enforcement officers on duty in the area and other units responsible for protection (e.g. Local Office of Nature Protection and National Parks) about the experts (their name, subject, specialization and working period).

2.2. Conducting the Inventory

Species group experts go to the sites included in the inventory plan on the dates specified in the same plan in order to conduct the inventory of species with conservation priority. Species group expert should definitely have a companion in order to ensure the safety during the field work, considering the problems that can occur during the field works. This companion who is going to accompany the expert throughout the field work can be either a volunteer or Forest Guards who know the area well and are assigned by the Enterprise Directorate, within the bounds of possibility.



Experts who examine the old Black pine trees in and around the Gölgeli Mountains, Kartal Lake

2.2.1. Field Work

The aim of the field works is to have as many species recording spots as possible. The sites (sections) will be visited according to the time schedule in the inventory plan. Species with conservation priority will be recorded in all the sections defined in the plan by using the inventory method chosen in the plan. Data from all the areas scanned should be used to fill in the Sampling Area Form provided in ANNEX 1.1 in order to reach the data about the presence of the species with conservation priority (observation, track etc.) For example, the area scanned while walking in the forest in order to observe (e.g. sound recording) a certain species of bird is a sampling area and the information describing this specific area should be filled in the relevant form. Any data collected for the species with conservation priority should be filled in the Species Record Form in the ANNEX 1.2. (ANNEX 1.2.1 Fauna Species Record Form and ANNEX 1.2.2. Flora Species Record Form).

Experts who set up camera traps for a wildlife study in Marmaris Enterprise Directorate

© Ayşe Turak & Hüma Ülgen

Experts who examine the old black pine trees in and around Gölgeli Mountains, Kartal Lake

© Uğur Zeydanlı

Even if a sampling area has been scanned but there is no record of species, Sampling Area Form should still be filled in, since the areas with no records also provide important data to identify the distribution of species. Besides, Sampling Area forms are going to be the reference documents to be used by the Enterprise Directorate/supervisors to check the suitability of the field work to the inventory plan report. There are issues that may change depending on species groups. These issues are provided below in general terms. However, please refer to the pages introducing species with conservation priority in the Practitioner's Guide, where information specific to each species with conservation priority is provided.

Wolf (*Canis lupus*)
© Naci Eyyüpoğlu

2.2.1.1. Large Mammals

During the inventory of the species with conservation priority in large mammal species group, spot record information from the local people in the area should be also taken into consideration, as well as the spots recorded through direct observation and tracks. The number of spots recorded for large mammal species, especially those living dependent on forest, based on direct observation by a short field work is expected to be few. For this reason, spot records obtained through recognition of feces, pug, paw prints or nibbling have a major part in the inventory.

Short interviews with the related people in the villages during the field works will provide important information revealing whether the species with conservation priority looked for is present in that area or not and will be directive in terms of allocating time to works such as direct observation and trace tracking in that area. However, it should be noted that names of some species may be confused, or a person from the local area interviewed may give hearsay information. For this reason, the information from the local people should be double-checked.

Camera traps can be also used to record spots in the Enterprise Directorates where the area to be studied is relatively small. Camera traps are installed in appropriate places and removed after a certain period of time, following which the photographs are evaluated. Camera traps should be left for a while (a minimum of 1-2 months) in the areas where they were set up, within the limitations of battery and image storage capacity of the camera trap used for the target large mammal species. As there is only a field work time of 5-10 days available for this work, half of this time can be spent on setting up the camera traps in the sampling areas chosen while the other half of it can be used to remove them from the area. However, as stated below, the use of camera traps should be evaluated well, as scanning large areas by using this method requires many devices and too much time and labor.

2.2.1.2 Small Mammals

Chionomys roberti
© Ahmet Karataş

Regarding the field works conducted for target small mammal species, the method of sampling by using trap is recommended to record locations of many species. In general terms, this work requires looking for suitable locations to set up traps (using signs such as nests of the species with conservation priority) throughout the day and installment of about 30 camera traps for each spot chosen towards evening. These traps are removed early in the morning and the work proceeds in a new spot on the second day. The areas where traps are placed are designated as Sampling Areas. Experts are advised to use at least 60 traps to keep the number of sampling areas for one day at a level that they can have a sufficient number of species records. The traps used for the work should be definitely the ones capturing living things. The traps must be the ones that do not kill any small mammals or does not give any harm to them (e.g. H.B. Sherman folding traps | 8x9x23 cm). The individuals captured should be released into the same area immediately after their capture and species recognition. They should not be reserved.

As spots of some small mammal species can be recorded by tracking nests, traces and direct observation (e.g. squirrel, Caucasian mole), conducting field works to produce records for these species is of importance.

2.2.1.3 Birds

Imperial Eagle (*Aquila heliaca*)
© Ahmet Karataş

Large raptors, black vulture and some woodpecker species are among conservation priority bird species. Different inventory methods are recommended for these bird species which have different ways of life. Potential nest locations should be chosen, and their active or potential nests should be located since it is important to locate the nests of black vultures and large raptors to be able to identify their habitats in the forests. As an alternative to finding their nests, sampling can be also done by choosing a spot seeing over the forest areas and identifying the birds that use that forest area for breeding or food. Regarding the woodpecker species, field work should be carried out on foot walking through the selected areas suitable for observation so that the individuals are observed or are called by voice, which allows identifying the individuals present nearby and recording. During the field works, spot records should be also produced for the conservation species observed in the sky and the behaviors observed (e.g. flying for mating, searching food) should be filled in the notes section.

2.2.1.4. Reptiles and Amphibians

Antalya lycian salamander (*Lyciasalamandra antalyana*)
© Kurtuluş Olgun

Species with conservation priority include some amphibians and snake species from reptiles. In order to have a high chance of success in inventory studies for conservation priority reptile and amphibian species, it is recommended that field studies be conducted overnight and towards morning. Therefore, daytime can be used to identify sampling areas with suitable habitats in the area to be studied on that day. Visiting these areas during the daytime and locating suitable habitats will significantly affect spot recording success. It will also be possible to observe and record the characteristics of the habitats in daylight.

2.2.1.5. Butterflies

(*Polyommatus alibali*)
©Ali Bali

For conservation priority butterfly species, field works should be conducted in sampling areas in the regions identified in the inventory plan. Butterfly count can be performed by transect method. While searching for suitable habitats in the region, observations in areas such as roadside should be filled in species recording/registration forms and taken as point records.

During the inventory works for butterflies, butterflies should not be caught with a net or other device. Species identification should be performed either directly or through observation through binoculars for butterflying.

2.2.1.6. Herbaceous and Woody Plants

For most conservation herbaceous and woody plants, observation and sampling should be carried out at the time of flowering in areas where the species is likely to be found according to the habitat preference of the species. One of the important points here is that flowering times may change according to seasonal periods, which may vary according to altitude, regional conditions and years. Areas with spot records obtained through previous studies (literature) conducted within the borders of the Enterprise Directorate should be included in the areas to be visited for the field work.

Adana hyacinth (*Muscari macbeathianum*)
© Barış Bani

During all field works, each record (signs such as direct observation, capture, trace, feces, etc.) of the species with conservation priority must be entered in the flora species registration form (Annex 1.2.2) with other information. During the daily work carried out in the areas determined in the inventory plan, each area scanned on foot will be designated as a Sampling Area and the relevant information should be filled in the Sampling Area Form (Annex 1.1.). For this purpose, it is necessary to have enough blank Sampling Area Forms and Type Registration Forms during the field work.

Kasnak Oak
(*Quercus vulcanica*)
© Necati Güvenç Mamıkoğlu

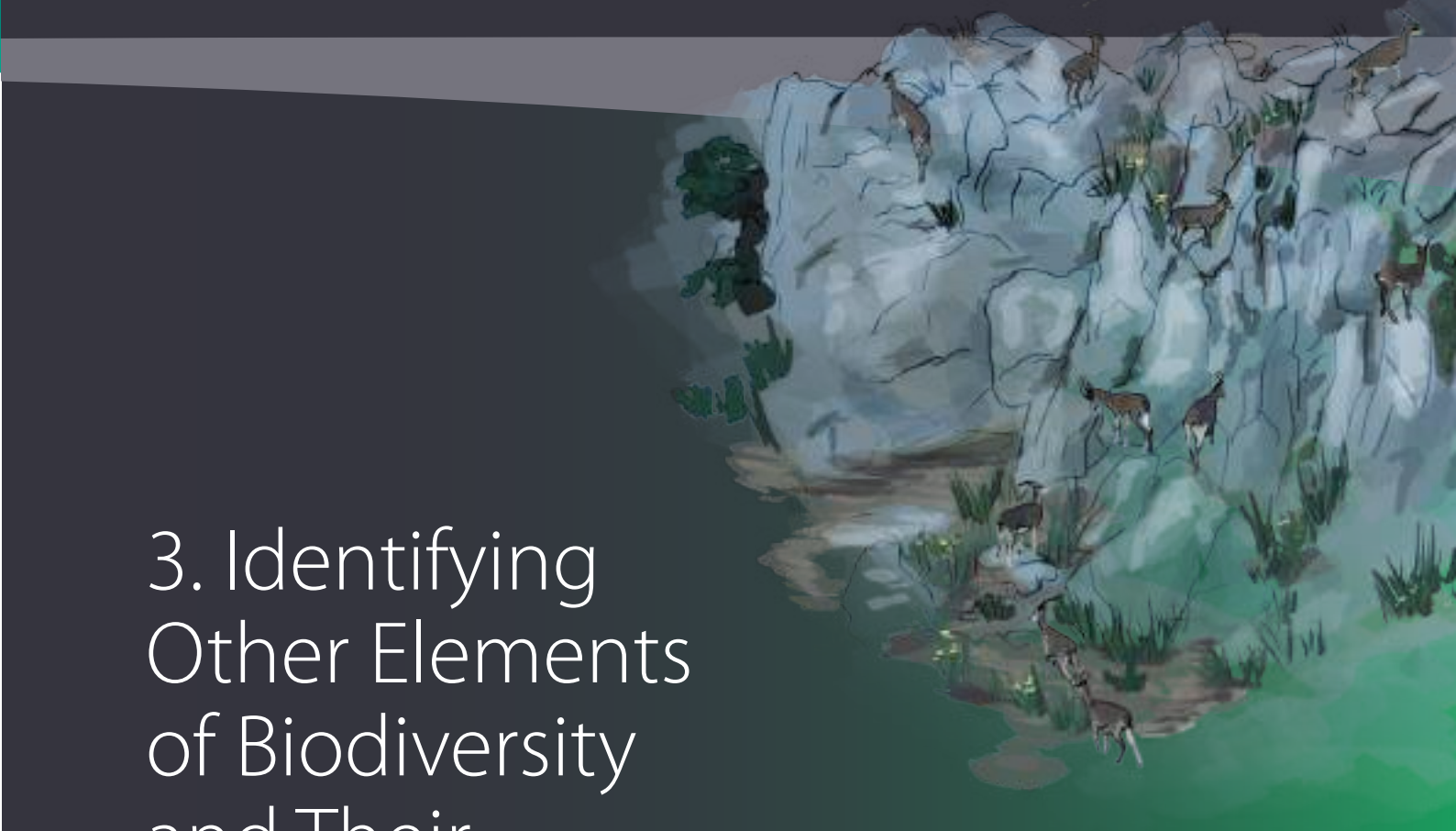
2.2.2 Final Report of Inventory

Species group experts will prepare a report summarizing their work once they have completed their inventory works on species with conservation priority. The format of this report and explanations relating to it are given in Annex 3. Inventory forms filled in the field should also be included in the inventory report. Finally, all forms filled out in the field must be entered in a table on the computer by using Microsoft Excel or similar programs in a way that it contains all the data.

The final report of inventory is not a report that summarizes only records of species with conservation priority. The inventory result report is also an important source document where the species group expert sees the Enterprise Directorate forests and related habitats from the point of view of the priority conservation species and provides observations and comments that will shed light on the studies to be conducted for the species with conservation priority in the field. Therefore, it is important to know what kind of information is required to be included in the final report of inventory and to observe the area from this point of view when field studies are carried out.

The final report of inventory and attached forms will be used primarily by the modeling specialist, after which it will be used by the biodiversity coordinator and forest engineers at the stages of function determination, working group division and decision-making for forestry practices for conservation priority areas to be identified at the end of the

© Uğur Zeydanlı



3. Identifying Other Elements of Biodiversity and Their Inventory

As mentioned in the previous chapters of this guide, biodiversity is composed of four main layers. Among the four main layers, the most studied and known is the species which is also the subject of the previous section. The other layers are genetic diversity, population / ecosystem diversity and ecological processes. Since the direct study of genetic diversity requires a very different and costly infrastructure, studies on it is not covered in this guide. For this reason, more emphasis is placed on population / ecosystem diversity and ecological processes, and their inclusion in the planning process is included in the study. The healthy functioning of ecological processes ensures the sustainability of the forest ecosystem, its renewability and the sustainability of species with conservation priority in the field.

3.1. What Are the Other Elements of Biodiversity?

Ensuring the sustainability of forest ecosystems is the basic principle of forestry. However, as in all ecosystem types, the sustainability of forest ecosystems depends on ecological processes and relationships. The existence of the units and factors that provide these processes are the sine qua non of a healthy and renewable ecosystem. In addition, some processes themselves appear to be a value for biodiversity. Therefore, these elements should also be considered in forest management.

However, there are very important basic challenges. The most important of these are about identification, description, measurement and location of ecological processes. Conducting this study in any field and including it in the planning process require years of research. However, it is not possible to devote so much time and resources to producing a management plan. It is therefore necessary to use other means of indirectly revealing this information. These tools can be grouped into three main groups;

1. Identifying the characteristics of area size, fragmentation and connectedness that reflect the most basic principles of ecology: Area size, fragmentation and connectedness will provide basic information about the ecological processes in a field and the status of species. These three characteristics play a very important role in any species' having enough individuals to maintain their sustainability in an area. Therefore, these three features allow us to make inferences about the population status, genetic structure, evolutionary processes and thus the sustainability of the species in the area.

2. To reveal some features related to the functioning of the ecosystem on basis of focus species: Some species play an important role in the functioning of ecosystems. The existence of other species in the ecosystem, the sustainability of the ecosystem and the healthy functioning of the nutrient cycle depend on the existence of this species. Therefore, it is very important to meet some criteria for the presence of these species in an area. Woodpeckers, for example, are important elements that ensure the healthy functioning of forest ecosystems. While woodpeckers keep their population in balance by eating bark beetles, many bird species can only nest in the holes opened and left by woodpeckers. Or the species at the top of the food web, such as the imperial eagle, control the number of other species. Therefore, their

Challenging conditions in nature due to human pressure and high altitude have led to reduction of integrity of the forests, giving them a fragmented structure.

© Hüma Ülgen

Black woodpecker *(Dendrocopos martius)* **is among focus species.**

© Ahmet Karataş

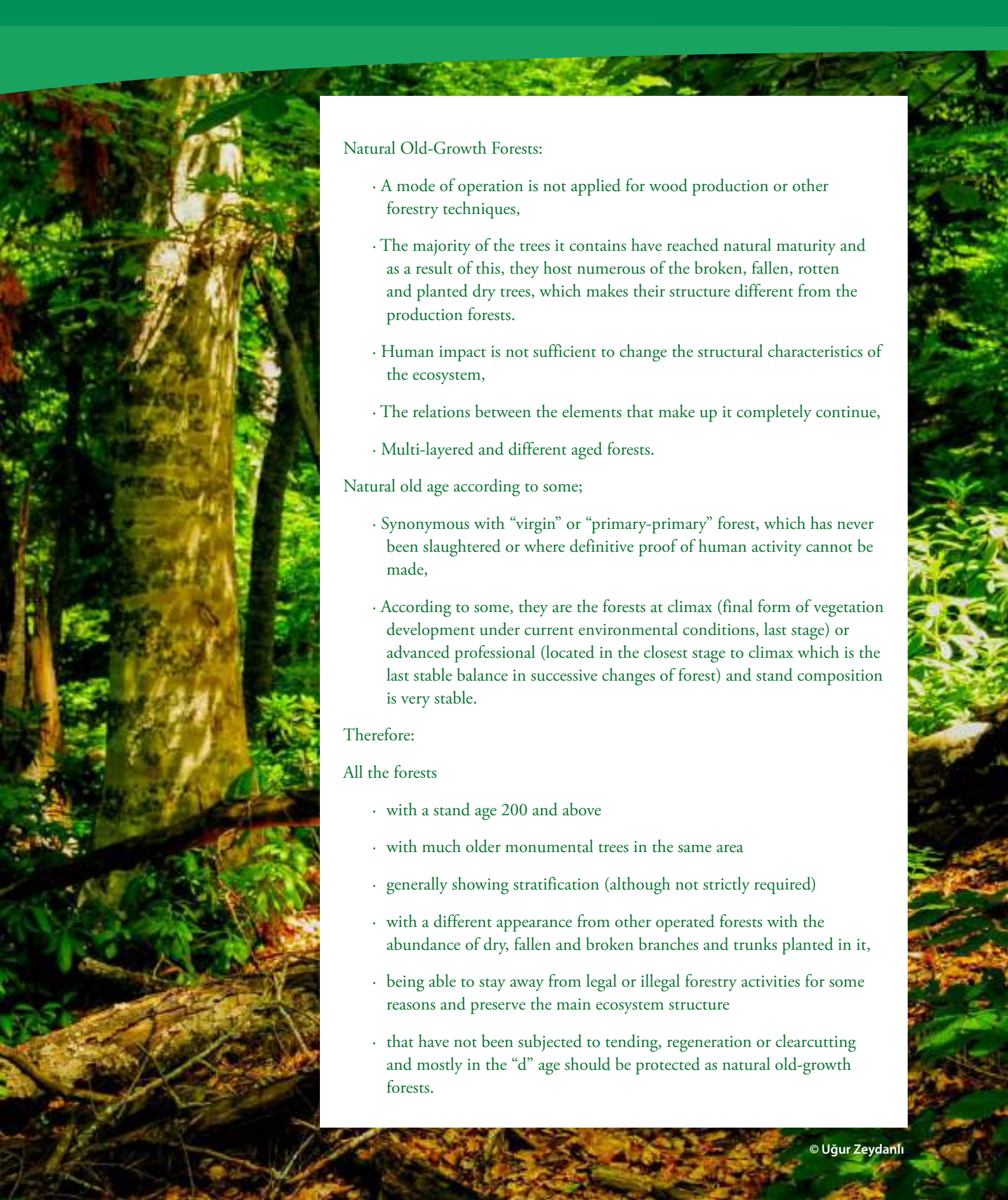
presence in the forest is very important. Although these elements are addressed in the species with conservation priority chapter, this chapter also focuses on the consideration of these focus species and the elements that will guarantee their existence in the forest in general.

3. Explaining the processes in the ecosystem based on physical and biological elements: The physical factors that the ecological and evolutionary processes are related to and the physical factors that lead to these processes are revealed. A special microclimate in the area, relict-enclave ecosystems caused by changes in vegetation during ice ages, or a different geological formation are examples of this.

Among these, seven processes that can be studied, mapped easily and included in the process of identifying conservation priority areas are identified as "other elements of biodiversity" (OEB).

3.1.1 Natural Old-Growth Forests

Natural old forests do not refer directly to an ecological process, but to the state where an ecosystem is located. However, considering the fact that ecological processes and other layers of biodiversity are found in a healthy way and sustainability is guaranteed in a forest part that has acquired the characteristics of a natural old forest, it would be correct to consider this situation of the ecosystem as an ecological process.



Natural Old-Growth Forests:

- A mode of operation is not applied for wood production or other forestry techniques,
- The majority of the trees it contains have reached natural maturity and as a result of this, they host numerous of the broken, fallen, rotten and planted dry trees, which makes their structure different from the production forests.
- Human impact is not sufficient to change the structural characteristics of the ecosystem,
- The relations between the elements that make up it completely continue,
- Multi-layered and different aged forests.

Natural old age according to some;

- Synonymous with “virgin” or “primary-primary” forest, which has never been slaughtered or where definitive proof of human activity cannot be made,
- According to some, they are the forests at climax (final form of vegetation development under current environmental conditions, last stage) or advanced professional (located in the closest stage to climax which is the last stable balance in successive changes of forest) and stand composition is very stable.

Therefore:

All the forests

- with a stand age 200 and above
- with much older monumental trees in the same area
- generally showing stratification (although not strictly required)
- with a different appearance from other operated forests with the abundance of dry, fallen and broken branches and trunks planted in it,
- being able to stay away from legal or illegal forestry activities for some reasons and preserve the main ecosystem structure
- that have not been subjected to tending, regeneration or clearcutting and mostly in the “d” age should be protected as natural old-growth forests.

Natural Old-Growth Forest Elements	Ecological Role	Biodiversity Role
Planted dry trees	- Planted dry trees and their branches indirectly contribute to the natural control of pests and reduce dependence on some expensive pesticides in agriculture.	- Provide nesting for birds and small mammals, - Provide the food environment for some bats and woodpeckers, the observatory for night roost hunting of owls;
Dead fallen trees	- Provides enrichment of soil in terms of organic matter, - Prevents erosion by holding soil, - Plays an important role in the saprophyte ecosystem cycle.	

Natural Old-Growth Forest Elements	Ecological Role	Biodiversity Role
Old trees	- Creates different habitat opportunities created by the diversity of age classes, - Provides a habitat for hunting birds at the top of the food pyramid, - Provides nest and roost for some important endangered bird species, - The hollows become home to reptiles, mammals, frogs, birds and invertebrates, - Due to their size, they provide more food sources and nesting areas than young trees, - Dead cover under old trees is always abundant, which reduces the effect of the drops on the soil. It provides food into the soil by decaying over a long period of time, leading to a large number of invertebrate habitats that live there. Some species from egg to larval period lives in the dead cover and spends its coming life on the top of the tree. It is also a shelter and nesting area for reptiles, amphibians and birds. Destruction of the dead cover causes a decrease in the number of species dependent on this habitat in large areas, - Large rotten branches falling from old trees maintain the life of the decomposers, - Provides shelter for snakes, frogs, invertebrates, lizards and mammals. It is also a hunting area for other larger animals.	- Maintaining genes of successful individuals in terms of genetic diversity, - Different habitat opportunities created by the diversity of age classes also support species richness, - Epiphytic plants

Natural Old-Growth Forest Elements	Ecological Role	Biodiversity Role
Intermediate tree layers	- Providing different habitat opportunities created by the diversity of age classes, - The richness of ecological processes and thus the creation of a more durable stand - Blocking the wind,	- The diversity of age classes creates different habitat opportunities to support species richness, - Woody species richness, - Richness in ecological processes,
The dominant tree species' forming at least double layer (such as a-d or b-d)	- Providing different habitat opportunities created by the diversity of age classes, - The richness of ecological processes and thus the creation of a more durable stand, - Blocking the wind and forming micro-climate.	- Increasing structural diversity with vertical layer richness, - Genetic diversity
Presence of trees that can survive in shade	- Increasing the number of insects that can be involved in pollination.	- Plant species richness, - Increasing insect species richness,

** Although the characteristics of old-growth forests are provided individually in this table to make sure they are easily understandable, it is necessary to perceive such phenomena from a wholistic approach. In fact, considering the network of relations in such an ecosystem, we can say that the whole has more ecological importance and biodiversity than the sum of the parts.*

The functions that distinguish natural old forests from others can be explained as follows:

- Conservation of natural / original forest structure
- Conservation of biological diversity
- Continuity of succession
- Protection of habitats
- Conservation of gene resources
- Forming reference stands for scientific studies
- Monitoring of forest development / change processes
- Forming natural shelters for fauna
- Protection of endangered species of saproxilicity (dependent on decaying wood)
- Aesthetic and tourism potential
- Water and soil protection function
- Micro-climate formation
- Being a symbol of prestige

This forest segment is the most important asset for biodiversity in your enterprise. Nowadays, it is unfortunately not very possible to find such sites. However, there may still be areas where the original forest structure is preserved in areas away from the villages where the road has not yet reached for various reasons. For this reason, road planning or other forestry practices for the opening of these areas where almost the last natural old-growth forests are left should be canceled and such areas should be protected first.

3.1.2. Species-Rich Forests

Tree species diversity can be considered as an indicator of biodiversity for the forest ecosystem and as a representative of ecological processes. Areas with high tree species richness are also considered as areas rich in ecological processes.

- Areas that offer a rich habitat to be home to different tree species also contain many different species, so these areas can also be considered rich in ecological processes,
- Different tree species can host different creatures. This means an increase in species richness and ecological processes in that area.

This feature should be evaluated by considering the specific characteristics of each ecological region. For example, for a broad-leaved forest ecosystem in the Western Black Sea, a number of more than 4-5 species is of value in diversity, whereas for a Turkish pine or Black pine forest in the Western Mediterranean, more than two species are considered important in diversity.

No intervention should be made in such areas. Interventions may cause some species to come to the forefront or adversely affect species composition and ecological processes, as any intervention will impair the characteristics of the area.

© Uğur Zeydanlı

3.1.3. Stands Varying in Terms of Tree Species Composition

Many factors affect the species' presence and density in an area. These are mainly physical features of the field, natural processes in the field, the struggle with other species and the survival strategy of the species. Since the effect of these conditions in the field change constantly, the way that certain species are present there and the mixtures they form with other species are in a constant change. This is one of the most basic information a natural resource manager should consider in field management.

However, in this dynamic and variable process, it is possible to capture some repetitive formations. Examples of this include the fact that oak and hornbeam are mixed in areas up to 1000 m high in the Eastern Black Sea, scotch pine, fir and *Juniperus sabina* coalesce in the Western Black Sea, and Turkish pine in the Mediterranean coastal zone forms a mixture with maquis elements. However, it is also possible to see formations or stands with different species composition. For example, an area where scotch pine and red pine compose mixed stands or stands made of scotch pine and sandalwood should be considered as areas with different species composition.

It is important not to intervene in areas with different species composition. Interventions may cause the ecological balance of the stand to be disrupted and, even if it is not in the short term, in the medium or long term, the rare species that give the stand its characteristics may disappear due to any intervention made.

© Uğur Zeydanlı

3.1.4. Large Forest Blocks and Connecting Corridors

According to the basic ecological principles, the size of the area is one of the basic elements that ensure the richness of the species, the sustainability of the species in the area and the richness of the ecological processes. Therefore, the intact, integrated forest blocks in our area and the forest parts that provide connection between these blocks should also be considered as important values.

Areas of this nature should be considered as a goal in the planning and management of forest ecosystems. The assessment of the size of large forest blocks should be made relative to the overall condition of forests in the ecological area studied.

The most important factor to be taken into consideration when managing these areas is to ensure that the edge effect, which is the typical result of the fragmentation, does not negatively change the presence of ecologically important living things in the interior, and that the blocks which are considered as corridors are protected. As long as the interventions do not lead to the elimination of forest cover, there is no problem in terms of sustainability of this ecological process.

Maintaining the quality of the habitats in these corridors is also important for the sustainability of the transitivity function provided by the critical corridors. Therefore, such areas should be intervened as little as possible, the crown closure should not be broken up, old and large trees should be able to survive in the stand.

3.1.5. Marginal Populations

Natural systems are constantly changing with their own internal dynamics and external influences. The long-term presence of species depends on their potential to adapt to this change, that is, their genetic diversity. This diversity is examined and measured at the population level. Different populations are compared with each other by conducting in-vitro analyzes using very expensive tools to measure this diversity. As a result, the genetic similarity between different populations of the species is revealed and information about the genetic diversity of the species is obtained. Conservation of populations with different gene pools is important both in economic and ecological terms.

There are important laboratories carrying out such studies for forest trees in our country. GDF Seed Improvement Institute, METU Department of Biology and Plant Science Laboratory are examples to such laboratories.

This genetic information is extremely important for the long-term sustainability of the species. If we base our forestry on the sustainability of forest ecosystems, we need to make a long-term planning that takes into account the genetic background of some important species. However, it does not seem possible for this information to be widely produced to cover a wide geographic region and to include many species at this stage, considering human resources and costs. Of course, this information should be considered in forest management for the species and areas where these studies are carried out. However, it is necessary to produce some solutions for the areas where this information is not available.

The basic approach here should be the low cost and rapid detection of populations of the species with different gene pools. For this, it is necessary to benefit from some basic concepts and principles. Differentiation in the gene pool of species within natural systems occurs either at the end of random processes or in the process of adapting to changing physical and biological conditions. In the light of this basic information, it can be assumed that populations in different ecological conditions will have different genetic structure. In fact, this concept is one of the basic concepts used in forestry and in our country. Seed transfer zones, for example, is an approach based on this assumption. On the basis of this assumption, it should be accepted that the populations of the species that have managed to colonize under different ecological conditions are important for genetic diversity. Geographical distribution and elevation can be considered as guiding factors in determining these populations. The outmost distributions in the east, west, north or south compared to the usual region where the species lives can be considered as populations with such characteristics. Again, if there is a population which is found at an altitude higher or lower than usual region of the species, it can be considered as a marginal population.

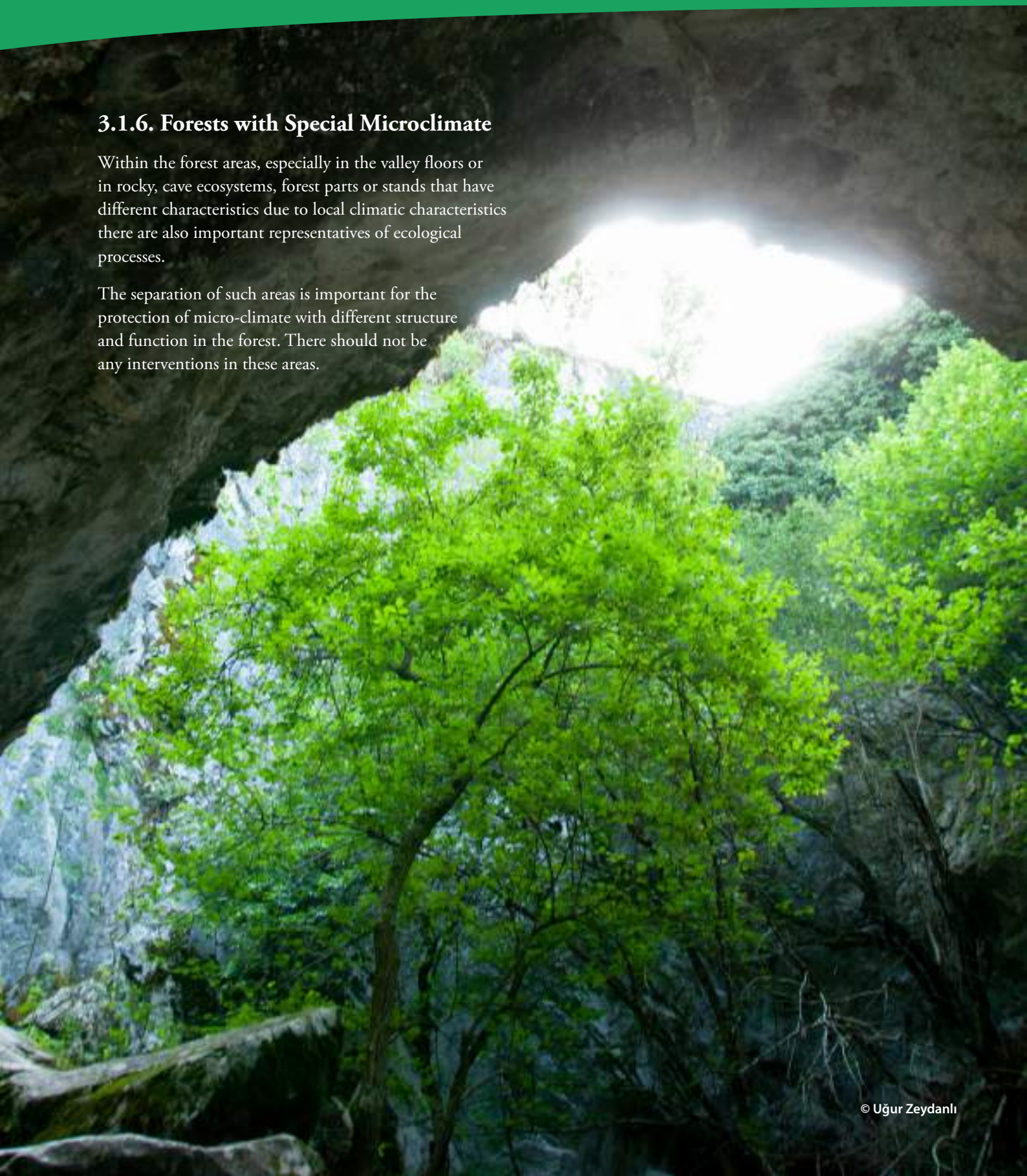
Beech stands growing at 2800 m at Yusufeli Enterprise Directorate, Altıparmak Sub-District Directorate can be given as examples for this. Although the beeches of this height are in the form of shrubs, these beeches should be considered as a value in the management plan since it is a special stand that can be grown under these conditions. Again, in Artvin Hatila Valley, on the border of Rize-Artvin, in the area called Çamburnu in Trabzon, the scotch pines descending to the coast or down to 300-400 m altitude are examples. Scots pine stands in Kayseri Pınarbaşı, cedar stands in Niksar, Turkish pine stands in the Black Sea, and Black pine forests in Ankara Beynam are similar formations that can be considered.

It is important not to interfere with the stands that contain marginal populations of the species. It is also important to designate these areas as strict conservation zones.

3.1.6. Forests with Special Microclimate

Within the forest areas, especially in the valley floors or in rocky, cave ecosystems, forest parts or stands that have different characteristics due to local climatic characteristics there are also important representatives of ecological processes.

The separation of such areas is important for the protection of micro-climate with different structure and function in the forest. There should not be any interventions in these areas.



© Uğur Zeydanlı

3.1.7. Relict-Enclave Ecosystems

Relict-enclave forest ecosystems are reflections of changes in vegetation as a result of climate change in geological times. As a result of cooling in geological times, the vegetation of the northern zone has spread to the southern latitudes. In later heating periods, vegetation peculiar to northern latitudes starts to withdraw from the area and is replaced by plant species that have adapted to the more temperate climate.

However, in some sheltered valleys, where the rainfall and humidity conditions are suitable, the vegetation of the northern regions can survive. Examples of this are the areas in the Amanos Mountains with beech, boxwood and yew, which are the elements of Euro-Siberia.

The opposite of this phenomenon took place in the Black Sea Region. During the post-glacial warming period, the species of the southern region began to colonize in the northern latitudes. However, in a later cooling period, these species disappeared from these areas. Again, in sheltered valleys, the Mediterranean vegetation has survived to the present day. Examples include the Coruh Valley, Hatila Valley National Park, Barhal Valley, where Mediterranean elements such as sandalwood and olives are found.

Any intervention in relict-enclave ecosystems should be avoided. In particular, afforestation with different species for the sake of remediation is the biggest misconduct in these areas. However, if the area is deteriorated due to intense pressure, then the species composition of the relict-enclave ecosystem should be studied for ecological improvement by considering the density ratios and structural characteristics of the species. It is important to designate these areas as strict conservation zones.

3.1.8. Water Sources and Peatlands in Forest

Although terrestrial systems dominate most of the world's surface, their sustainability depends on their relationship with aquatic systems. The cycle of many elements in terrestrial systems and their transfer within the system depends on aquatic systems.

Many species move and spread through the valleys. The valley systems, with their topographic structures and climatic characteristics, play an important role in ecological and evolutionary changes that species go through and their movements due to biogeographic dynamics.

Peatlands are wetland ecosystems, which are characterized by the accumulation of organic matter called "peat", consisting of dead and decaying plant material under high water saturation. Although species diversity in peatlands is low, peatlands contain a high number of characteristic species that is unlikely to be found in arid ecosystems within the same biogeographic region.

Therefore, for sustainable forest ecosystems, it is very important to protect aquatic systems and peatlands in the area and ensure that they are affected least by forestry activities. For the same reason, protecting them against other factors is of great importance.

© Uğur Zeydanlı

Rivers and other aquatic ecosystems within the forests are systems that are highly affected by the activities around them. These ecosystems are particularly affected by the sediment transport in streams and ponds, the quality of water, forestry activities around edge and coastal habitats. Such characteristics of aquatic ecosystems can easily deteriorate as a result of forestry interventions. The restoration works in damaged peatlands require quite intensive and expensive practices. Therefore, interventions to areas around stream beds and other aquatic systems should be avoided as much as possible. Although the interventions in these areas occupy a small area, they will have a much greater impact considering the role of aquatic systems in the ecosystem.

For this reason, it is necessary to designate a certain zone of peatlands and streams around the ponds and creeks in the forest as strict conservation zones. The size of this zone varies according to the slope of the area, the nature of the vegetation and the characteristics of the habitat. However, generally a zone with a size varying between 35-100 m is formed. This zone may sometimes be larger.

3.2. Identifying Other Elements of Biodiversity and Their Inventory

Before the inventory studies to be carried out in the field, it is necessary to determine which OEB are present in the related Enterprise Directorate. This is because a list such as the list of species with conservation priority available in the Enterprise Directorate, as with the species with conservation priority, is not available for the OEB. Therefore, the first study is to determine the candidate areas of the OEB that are estimated to be located in the Enterprise Directorate. Then, OEB and the recommended areas to be separated for them will be determined by field works conducted in these candidate areas.

Although there are different determination criteria for each OEB, the general steps covered by the study can be summarized as follows:

1. A preliminary analysis study is carried out (by the GIS-Modeling expert) to identify potential areas where specific OEB may be present, using the digital GIS layers of the Enterprise Directorate. A map showing the candidate sites identified for each OEB is produced.

2. Before the field work, a meeting is held with the Sub-District Directors, Forest protection officers and other experts working in the Enterprise Directorate. In this meeting, the OEB and their characteristics are explained by giving examples. Then, the participants from the Enterprise Directorate (Sub-District Directors, Forest protection officers, etc.) are asked whether such areas exist and where they exist, and these fields are added to the maps as candidate sites.

3. Using the above information, an inventory study is planned for candidate sites and an Inventory Plan Report given in ANNEX 5 is prepared.

4. Candidate sites are visited to see if they are the areas with the characteristics of the relevant OEB. During the field work, notes are taken about each area and photographs are taken. The boundaries of the sites are noted on a sub-compartment or compartment basis or, if possible, with a more detailed boundary definition and coordinates are recorded. For this purpose, the Candidate Site Form given in ANNEX 4 is filled separately for each field.

5. After the fieldwork, the information collected is reviewed together and the areas and boundaries for OEB are determined and the final report is prepared in accordance with the format given in ANNEX 6.

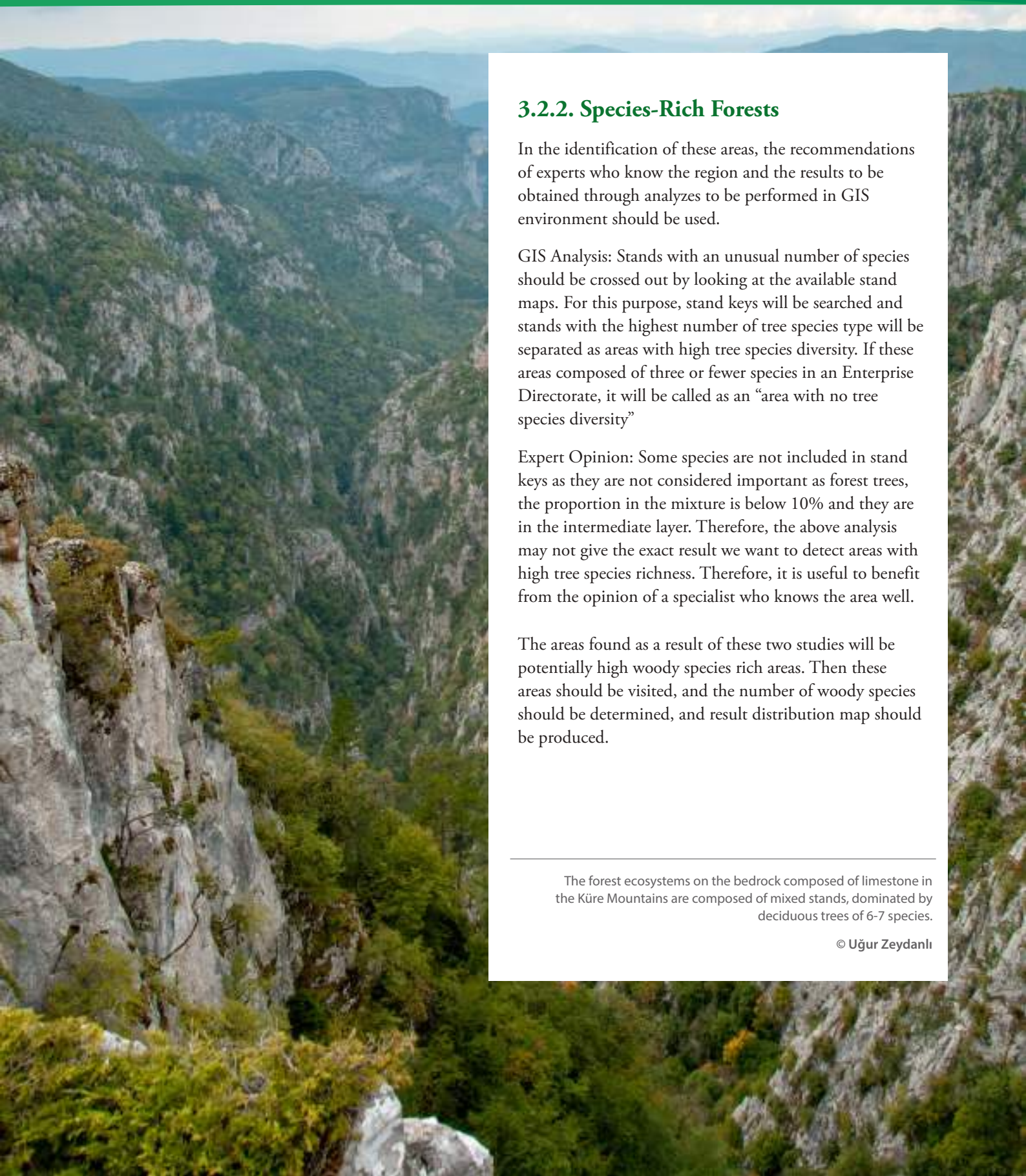
The following sections describe how this study will be carried out for each OEB. An inventory plan report will be prepared for the field work to be carried out for OEB which is identified as being located in the enterprise and of which candidate sites are determined (see ANNEX 5). This plan will be shared with the Enterprise. Field works will be carried out on the dates and periods specified in the inventory plan following the approval of the plan by the enterprise and obtaining the necessary permissions from the local authorities (gendarmerie, national parks authorities etc.) for the expert (s) who will work in the area to ensure conduction of works in a safe manner. Field works will be carried out by the biodiversity coordinator. The coordinator, who will also partially participate in the field works of the species group experts, can make assessments for the OEB during these studies.

3.2.1. Natural Old-Growth Forests

It will be the most effective way to benefit from the employees of Enterprise Directorate, who know the region well, in determining natural old-growth forests. Their proposed areas should be recorded as potentially natural old-growth forests. In addition, it would be beneficial to cross out the stands with "d" keys from the stand maps and add them to the list of potential natural old-growth forests. Afterwards, these areas should be visited and the areas that have the characteristics of a real natural old-growth forest should be determined. The stands which will be considered as natural old forests are expected to have the following characteristics;

- Consists of individuals of unusual age and height,
- Double plate structure,
- Planted dead individuals,
- The presence of dead, fallen, leaning individuals.

© Uğur Zeydanlı



3.2.2. Species-Rich Forests

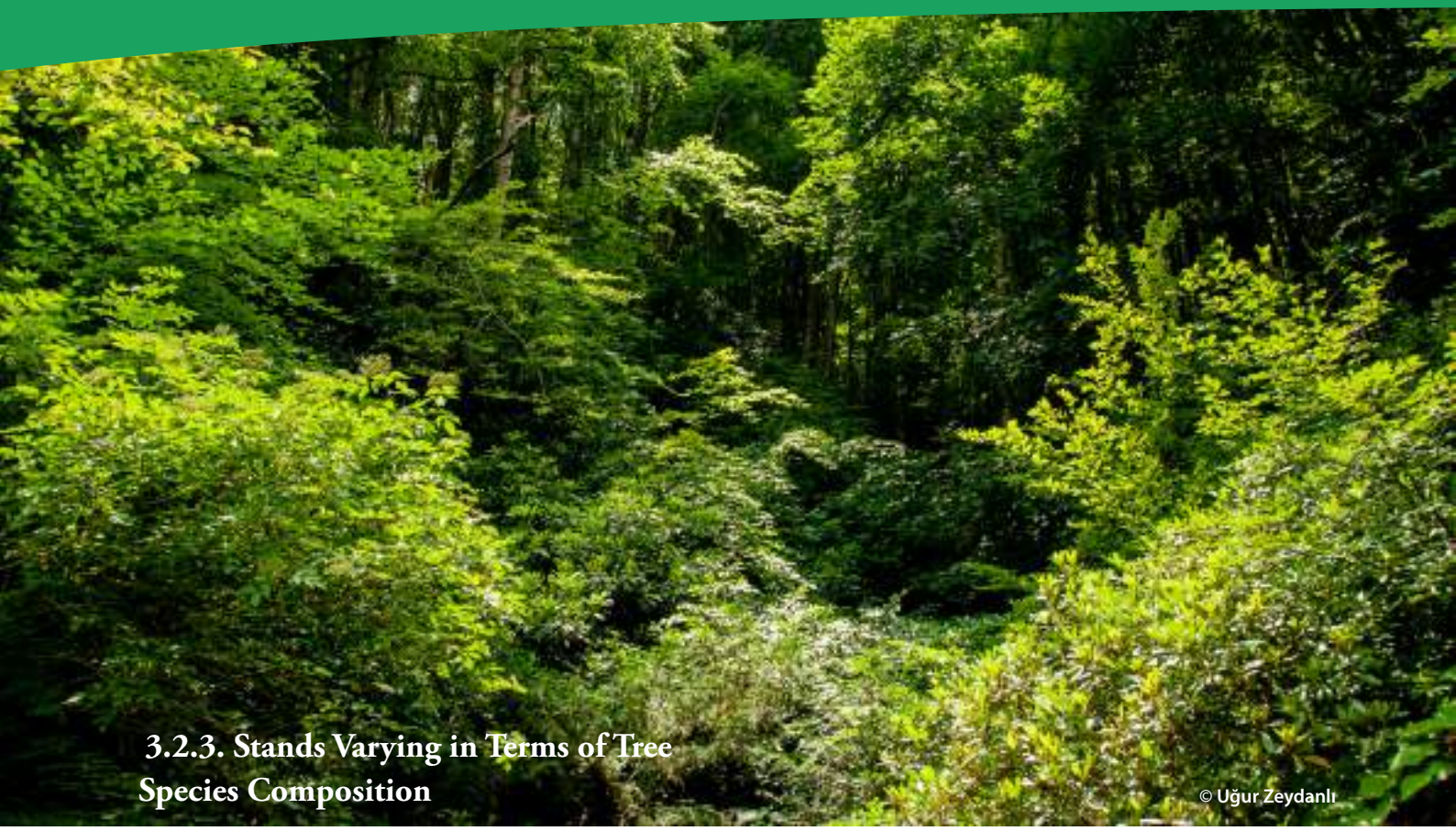
In the identification of these areas, the recommendations of experts who know the region and the results to be obtained through analyzes to be performed in GIS environment should be used.

GIS Analysis: Stands with an unusual number of species should be crossed out by looking at the available stand maps. For this purpose, stand keys will be searched and stands with the highest number of tree species type will be separated as areas with high tree species diversity. If these areas composed of three or fewer species in an Enterprise Directorate, it will be called as an "area with no tree species diversity"

Expert Opinion: Some species are not included in stand keys as they are not considered important as forest trees, the proportion in the mixture is below 10% and they are in the intermediate layer. Therefore, the above analysis may not give the exact result we want to detect areas with high tree species richness. Therefore, it is useful to benefit from the opinion of a specialist who knows the area well.

The areas found as a result of these two studies will be potentially high woody species rich areas. Then these areas should be visited, and the number of woody species should be determined, and result distribution map should be produced.

The forest ecosystems on the bedrock composed of limestone in the Küre Mountains are composed of mixed stands, dominated by deciduous trees of 6-7 species.



3.2.3. Stands Varying in Terms of Tree Species Composition

© Uğur Zeydanlı

For this study, stand with different composition should be determined by looking at stand keys. Afterwards, these stands should be reviewed with the experts from the Enterprise Directorate and the prevalence or rarity of such stands in the region should be inquired. If areas of this nature are rare, these areas should be verified by field works and the work on them should be finalized. Here, the basic principles to be used in the assessment of the rarity are as follows;

- There are no stands with this composition in the other Enterprise Directorates,
- There are no stands with this feature in the other Sub-District Directorates in the Enterprise Directorate,
- The size of all areas with such characteristics is below 100 hectares

After a filtration to be performed taking these criteria into consideration, the stands should be determined as “Areas with Different Species Composition”.

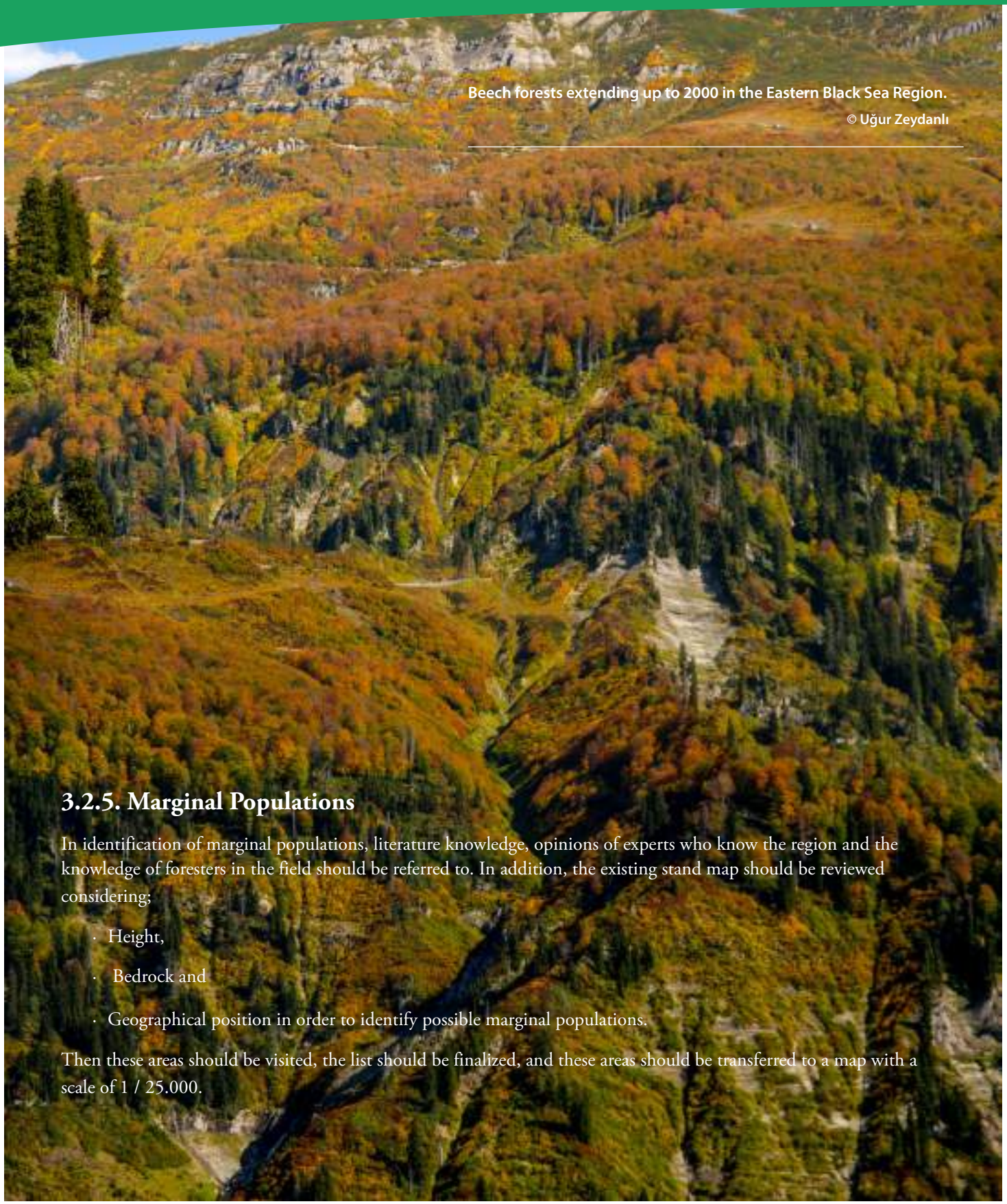
© Uğur Zeydanlı

3.2.4. Large Forest Blocks and Connecting Corridors

© Uğur Zeydanlı

The identification of large forest blocks should be carried out using a digital stand map via GIS. For this, the size of each compartment will be calculated and then the largest 10 polygons will be determined as large forest blocks. These blocks will not be used directly in the determination of conservation targets, but will be addressed in general practices in terms of quality of life as a habitat and measures to prevent fragmentation.

Critical corridors that will interconnect these blocks within themselves and with each other will also be determined by using GIS. These corridors will be considered as conservation targets in the analysis process.



Beech forests extending up to 2000 in the Eastern Black Sea Region.
© Uğur Zeydanlı

3.2.5. Marginal Populations

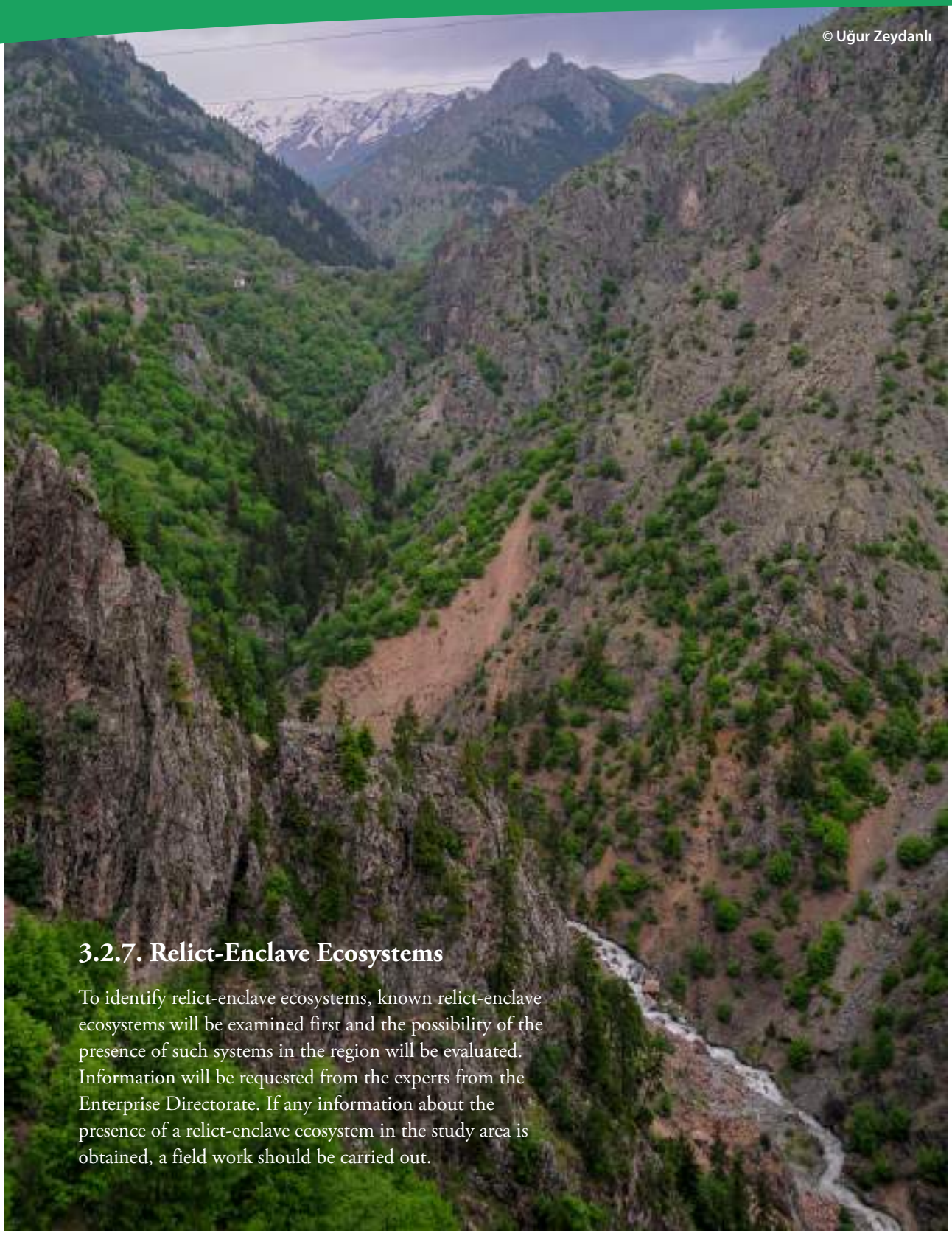
In identification of marginal populations, literature knowledge, opinions of experts who know the region and the knowledge of foresters in the field should be referred to. In addition, the existing stand map should be reviewed considering;

- Height,
- Bedrock and
- Geographical position in order to identify possible marginal populations.

Then these areas should be visited, the list should be finalized, and these areas should be transferred to a map with a scale of 1 / 25.000.

3.2.6. Forests with Special Microclimate

Preliminary detection of these areas should be done together with the personnel of the Enterprise Directorate who know the area well. Information about this type of field can also be obtained from local universities and research units. Candidate sites determined in accordance with the data collected, should be examined on site by field work.



3.2.7. Relict-Enclave Ecosystems

To identify relict-enclave ecosystems, known relict-enclave ecosystems will be examined first and the possibility of the presence of such systems in the region will be evaluated. Information will be requested from the experts from the Enterprise Directorate. If any information about the presence of a relict-enclave ecosystem in the study area is obtained, a field work should be carried out.

3.2.8. Water Sources and Peatlands in Forest

Inland forest rivers, lakes, wetlands and other water resources in the area should be found out using topographic maps of 1 / 25.000. Then, if there are some important elements among these wetlands and streams, they should be considered as of value.

© Uğur Zeydanlı

3.2.9. Visit to the Candidate Sites and Their Assessment

Candidate sites determined by preliminary studies are visited for the identification of OEB. In order to determine the extent to which these areas carry the characteristics of the relevant element, the explanations given previously in this guide and the criteria given in the Introduction to Other Elements of Biodiversity in the Practitioner's Guide should be taken into consideration. Notes should be kept as to which of these characteristics the area carries, and photographs and coordinate records should be taken (see ANNEX 4). Wherever possible, candidate areas should be entered, and the areas should be examined on foot. In cases where this is not possible, general photographs of the area should be taken and notes should be taken as much as possible. In addition, more detailed information about the area should be obtained from Forest protection officers and Sub-District Directorates who know the area better and filled in the forms.

3.2.10. Inventory Report

The OEB inventory report will be prepared by the biodiversity work coordinator. The report should contain the following information:

- The results of the potential area determination study using GIS layers,
- The literature review, preliminary results obtained through the interviews with experts who know the region and the Enterprise Directorate,
- Map of potential areas obtained through preliminary studies and the field work program,
- Evaluations of the observations made in the field study and explanation on the characteristics of each of the areas reserved for the other elements of biodiversity and using selected photographs,
- Map showing areas of other elements of biological diversity,
- Explanations on existing threats and other important observations and assessments in these areas.

The forms completed during the field works will be edited and attached to the end of the report.

Inventory results report is not a report showing only maps and records of the OEB. It is also a reference document that will be used during the implementation phase, providing information on Enterprise Directorate forests, ecological processes therein and the operation of the ecosystem. Therefore, it is important to know what kind of information is required to be included in the inventory results report and to examine the area from this point of view when carrying out the field works.

4. Analysis of Biodiversity Data

It is necessary to complete any missing information obtained through inventory studies and to produce outputs in the appropriate format in order to reveal conservation priority areas where an outstanding biological diversity in the Enterprise Directorate is identified and to determine functions and enterprise classes. The analyzes to be performed for this purpose are discussed in four main stages in detail in sections 4.1, 4.2, 4.3 and 4.4. Section 4.5 provides examples of these stages.

In the first stage, species distribution modeling is done using inventory data collected by experts. In this way, the distribution areas of the species with conservation priority in the whole Enterrise Directorate are determined.

In the second stage, areas with species distribution and other elements of biodiversity are assessed and conservation priority areas (strict conservation and limited implementation zones) that are important for biodiversity and require specific practices are identified.

In the third stage, tables, maps and reports are prepared to guide the planning of the practices in these areas. The third stage also includes an evaluation meeting with the Enterprise Directorate and the determination of the precise borders of the conservation priority areas.

In the fourth stage, implementation prescriptions for limited implementation zones are prepared and integrated into the relevant tables of the forest management plan.

4.1. Identifying the Distribution of Species with Conservation Priority

By using inventory data collected by experts, species distribution modeling is performed, and habitat suitability of the species is revealed. The borders of potential distribution areas are drawn and mapped.

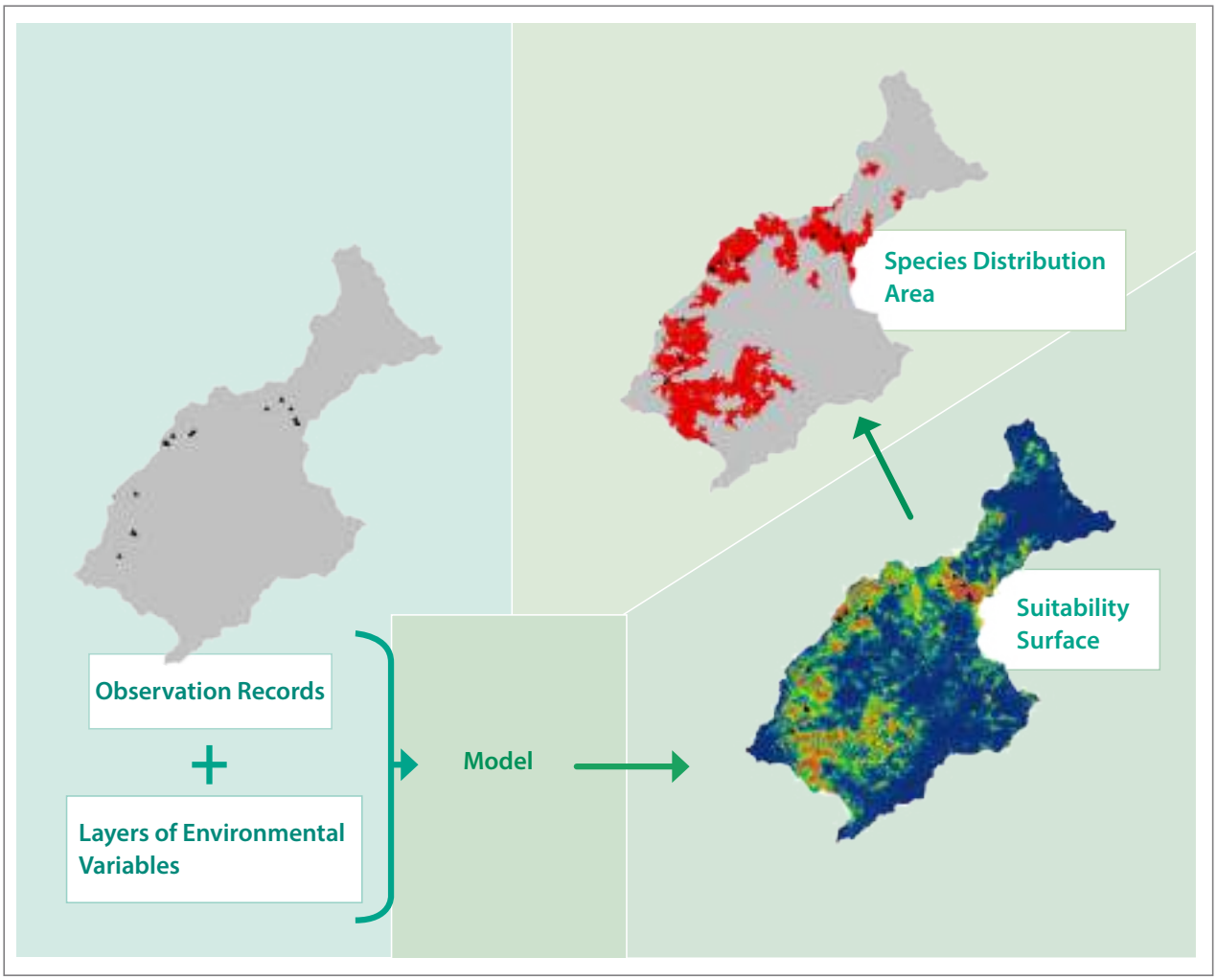
Rupicapra (*Rupicapra rupicapra*)

© Hüseyin Ambarlı

In the context of the integration of biological diversity into management plans, the species distribution modeling study is an important stage for the conversion of species observation records obtained from the inventories of species with conservation priority and other sources (e.g. literature) into species distribution area data (See Figure 7 for the modeling process conducted for Chamois (*Rupicapra rupicapra*) in the project area under the Kaçkar Mountains Sustainable Forest Use and Conservation Project). The basic logic of the modeling process is the analysis of how environmental variables such as altitude, slope, precipitation, etc. are effective in the distribution of the species and the implementation of the result that is revealed from this analysis to the whole study area. The resulting relationship definition (model) is a formula that expresses the level of relevance for the distribution of the species, and its variables are environmental variables. This model can be applied to the spots/points where there is no information about the presence of the species, but where there is information about the environmental variables, and in this way, it can be determined how suitable these environments are for the species. The outcome of the modeling is the surface showing the degree of suitability of the environment for the species. The distribution maps showing the possible presence of the species are produced using this surface (see Section 4.5 for examples produced via previous studies).

In the biodiversity analysis for integration into the management plan, the distribution modeling should either be performed directly on digital maps on GIS or by using interfaces that provide information exchange with GIS, since distribution layers are required for the identification of conservation priority areas.

Figure 7. Modelling process of species distribution.



The modeling process has three components:

- Species observation records,
- Layers of Environmental Variables,
- Modeling method.

Wild goat (*Capra aegagrus*)

© Deniz Özüt

4.1.1. Preparing Species Records

The process of preparing the species records for the modeling studies is the process of determining the data with suitable quality and resolution for use by analyzing the data quality and bringing it into a format suitable for the modeling method.

Compilation of species data

At this stage, in addition to inventory records, location records compiled through literature review are used (database of BİYOD software prepared by GDF and Nuhun Gemisi database can be used). In addition, if there are species group experts who have already worked in the region, unpublished records obtained through interviewing them are also included in the modeling studies. However, currently there are a limited number of observations records for species in Turkey. Therefore, the quality of the records obtained through species inventories made for integration purposes will be determining in the accuracy of the distribution areas to be produced. This relationship becomes more important, especially if there are more factors affecting species distribution.

Examination of species records in terms of usability and reliability

Examination of the species records in terms of different factors allows the determination of suitable data for use and, accordingly, the determination of applicable modeling techniques. Factors affecting the usability of observation records in modeling studies are as follows:

- Number of records,
- Distance between records,
- Reliability of species identification,
- Wrong absence records as a result of inadequate observations,
- Accuracy and resolution of the recording coordinate,
- Sampling errors.

All data are assessed based on these factors and those with a certain quality to be used are identified.

Preparing records in an appropriate format

The format of the species records may vary depending on the modeling method and the software used. After the determination of the modeling method to be used, species data are re-evaluated and which ones can be used as input for modeling, which will be evaluated for the checking of the model and which will not be included in the study. The data is then prepared in an appropriate format.

In most of the existing modeling software, it is enough to prepare the records as a "txt" file containing coordinate data (see example Table 4). Sometimes the values of environmental variables at these points/spots are included in the same table. In the case of modeling software that works directly on or in connection with GIS, or where mechanical modeling is to be made, the records are prepared as GIS layers with the same projection as the layers of environment variables.

Maxent software can use the text file in the following example as an input:

Species name, X coordinate, Y coordinate

Capra_aegagrus,705681.2,4517905

Capra_aegagrus,721973.3,4522604

Capra_aegagrus,723314.7,4523049

The Biomod software can use input in the format given in the following example. The first column contains the species code, the second and third columns contain the coordinates of the record locations, the following columns contain values for each environmental variable at these record locations, and the following columns contain information about the presence of each species at these record locations:

Table 4. Sample species record table for Maxent and Biomod modeling softwares.

Idw	X	Y	Var1	Var2	Var3	Var4	Var5	SP281	Sp290	Sp277	Sp164	Sp191
74	-9,3	38,6	0,67	4296	770	39,3	16,7	0	1	0	1	1
75	-9,3	39,5	0,76	4174	928	57,3	16,4	0	1	0	1	1
76	-9,3	39,1	0,74	4173	870	50,1	16,4	0	0	0	1	1
77	-8,3	37,7	0,55	4264	620	25	16,7	0	0	0	0	0
78	-8,1	37,3	0,54	4169	622	25,2	16,5	0	0	0	0	0


© Uğur Zeydanlı

4.1.2. Preparing Digital Layers to be Used in Modelling

The determining variables (environmental variables) are environmental factors that influence the distribution of the species. This effect may be directly related to food or shelter. There may also be conditions that determine the limitations imposed by the climatic conditions on which the species can withstand or the limits in the competitive environment. The most commonly used determinant groups are those related to topography, climate and forest cover classes. A large number of determinant variables can be used according to the physiological requirements of the species. Environmental variable layers can be either qualitative (e.g. forest cover class, water presence, rock presence) or quantitative (height, precipitation, average temperature, etc.). When necessary, qualitative variable layers can be converted into quantitative data layers (such as distance to rocks, proximity to forests).

Since the data quality is the most important factor determining the modeling result, the factors affecting the quality of these layers are taken into consideration during the creation of digital layers for environmental variables, and environmental variable layers that are not of sufficient quality are not used. These maps are prepared as digital GIS layers. The main determinants of data quality for environmental variable maps are:

- Resolution of maps,
- Interpolation methods used,
- Reliability of data used in interpolation.

© Uğur Zeydanlı

Some of the environmental variable layers may show high correlation among themselves. For example, there is often high correlation between some climate data. Before using such data in the model, correlation analysis can be done so that the number of variables is reduced or Principal Component Analysis (PCA) can be applied.

The format of the raster layers that make up environmental variables varies according to the methods and software used. Most programs use the 'ASCII' format.

Resolution of environmental variable layers and matching them

Environmental variable maps prepared for modeling purposes are prepared as raster layer. The resolution and area of all layers must be the same and the pixels must overlap exactly.

When determining the resolution to be used, the resolution and size of all available layers are taken into consideration. Usually the resolution of the layer with the highest resolution is used. In this case, the pixels of the low-resolution layers are larger than the high-resolution layers, and there is no problem with giving the same value to all the small pixels contained in these large pixels. Interpolation method can be applied when the resolutions of the near-resolution layers are equalized.

The most commonly used environmental variable layers and creating them

Topographic variables: Variables such as altitude, slope, aspect and topography are included in this group. All of these variables are layers that can be obtained using digital altitude data on GIS Within the scope of the integration works, the altitude layer to be obtained from contour lines in the 1 / 25.000 digital elevation maps provides an appropriate resolution for the works conducted on the scale of Enterprise Directors.

Climatic variables: These are the minimum, maximum and average temperature and precipitation on a monthly or annual basis and the indices derived from these variables. These layers can be obtained on a spherical or local scale, through extensive models or simpler interpolations. If reliable layers are available under the integration works implemented, it is preferable to use relatively higher resolution climate data which is prepared locally.

Variables related to vegetation: These can be layers related to forest cover type, crown closure, stratification or age. Data on forest cover in the context of integration can be obtained from 1 / 25,000 digital stand layers. In areas outside forest areas, this data can be generated by using Corine land use layers or 1 / 25,000 topographic maps. The map and layers used should be kept up to date. Especially when the forest stand map/layer to be used is from a previous plan period (10 or 20 years ago, the Enterprise Directorate which is going to carry out the work is asked to give information about the areas with changing crown closure or tree species (due to afforestation, regeneration, disaster etc.) on a scale of sub-compartments or compartments so that the necessary updates for the stand map is ensured.

Layers related to threats and pressure: These can be layers of population density, human impact, proximity to settlements, relationship with vehicle roads, and other sources of threat. Layers such as settlement areas and agricultural areas can be obtained by making use of 1 / 25.000 digital maps.

4.1.3. Modelling

The modeling process is a process that requires the modeling specialist to work with the species group specialist. In this process, the role of the species group expert starts at the stage of evaluation of species observation records and determination of reliable records. The species group expert is also a guide in identifying layers of environmental variables that are expected to be important in the distribution of the species. The modeling expert determines the most appropriate modeling method for the quality, quantity and resolution of the species observation records and completes the first stage of modeling. The model results are then evaluated jointly by the species group expert and the modeling expert, and changes that can be made to improve the model are identified. At this stage, the expert examines the results of the model together with the modeling expert by making use of the observations he/she made during the field works in the region and his knowledge and experience related to the species. As a result of this analysis, the modeling expert creates new models by making changes in the environmental variables used, the records used for training and control, modeling methods or modeling software. The modeling expert produces individual models for different areas of the working area, if necessary. This process is repeated by the species group expert until a suitable model is obtained (Figure 8).

The functioning of the modeling process depends on the technique chosen and the software used. Most software includes modules specially developed to use observation records only.

Wherever possible, the model is rebuilt many times in order to eliminate the model from random results and the most successful model is selected or suitability maps are averaged.

Figure 8. Modelling Process

1. Evaluation of available information: Evaluation of information such as records, environmental variables, habitat requirements, and identification of modeling techniques that can be applied depending on matching of records and environmental variables (The scope of the study here, is defined by four modeling approaches, as given in C.a.).

A. Identifying possible environmental variable layers: Investigating the environmental variables that are / are likely to be effective in the distribution of the species and identifying the possible layers by evaluating the following conditions.

a. What environmental variable layers are available?

b. What are the resolutions?

c. What other layers of environmental variables can be produced using these?

B. Determining available data sets: Species detection of species records, examining them in terms of location and resolution and determining the appropriate data for use *(Factors affecting the usability of observation records in modeling studies include number of records, distance between records, reliability of species detection, accuracy / resolution of recording coordinate, incorrect absence records as a result of missing observations or sampling errors).*

a. **Modeling on detailed scale and test data:** Records that are reliable in terms of species detection and location, and those whose coordinate resolution is compatible with the resolution of environmental variables.

b. **Rough test data:** Other reliable records for species identification and location.

C. Determining modeling techniques: Evaluation of possible environmental variable layers and available datasets together.

a. Which modeling approach can be adopted?

i. There are many reliable locality records → Correlative modeling

ii. The physiological response of the species to environmental conditions is known in detail → Mechanistic modeling.

iii. Only the rough categorical habitat requirement information is available → Habitat distribution modeling

iv. The species to be modeled can be grouped in terms of habitat requirements → Environmental clustering

b. Which method can be applied? → Modeling method and software

i. "Not available" data is available → Modeling methods supporting Available-Not Available data,

ii. "Not available" data is not available → Modeling methods that produce Pseudo-not available data,

iii. Which GIS and modeling software can be accessed → Optimal modeling approach and software

2. Organizing the data: Organizing the records and the necessary environmental variable layers in a format appropriate to the modeling technique and software.

3. Modeling: Examining the relationships between the distribution of species and environmental variables, defining the model covering these relationships, testing and refining the model, transforming it into a distribution area.

In Habitat distribution modeling and Environmental clustering approaches, relationships are converted directly into distribution area. In Correlative Modeling and Mechanistic Modeling approaches, the habitat suitability layer is produced first.

A. Forming the habitat suitability layer:

a. Mechanistic modeling:

i. Creating correlated functions

ii. Modeling by determining the dominance of different factors

iii. Applying the model to the whole area, other regions or future conditions

b. Correlative modeling (Modeling software are used): Values of parameters and outputs are determined, software is run.

B. Assessment of the outputs and refining the model: At this stage, the species expert and the modeling expert examine the habitat suitability layer produced, model success and the model itself. If changes are required in parameters, layers of environmental variables, or even modeling approach and software, these changes are identified. The steps provided under 3.A and Stage 2, if necessary, are repeated. These steps are repeated until the appropriate model is created.

C. Creating the species distribution area layer: The potential species distribution area is identified and, if necessary, if there are areas where the species is known to be extinct for various reasons (e.g. overfishing), the distribution area is limited using this information.

a. Correlational modeling: Threshold values generated by the modeling software are evaluated by the expert considering the purpose of the study, and areas with a habitat suitability greater than this threshold value are designated as potential species distribution areas.

b. Mechanistic modeling: Considering the purpose of the study, the species expert evaluates the suitability surface in terms of recording locations and determines a threshold value. Areas with habitat suitability greater than this threshold are designated as the potential species distribution area.

c. Habitat distribution modeling: The different habitats in the area are classified as habitats that are suitable and unsuitable for the species, and areas containing suitable habitats are designated as potential species distribution area.

d. Environmental clustering: The study area is divided into different regions in terms of environmental variables using "Statistical Clustering" methods. All environmental clusters in which the species is recorded are included in the potential species distribution area.

D. Reassessing the outputs, refining the model if necessary, or changing the approach and / or techniques: At this stage, the species expert and the modeling expert examine the species distribution area layer produced. If changes are required, they are detected. Steps provided under 3.A and 3.B and / or 3.C and, if necessary, Stage 2 is repeated.

4.1.4. Verification of the Models

The method used to test the accuracy of the model varies according to the modeling technique and the software used. The main approach in all methods is to examine the value of the model at the locations where the observation recordings are made. Generally, some of the observation recordings are not evaluated (not included in the training set) during the creation of the model, but used only for verification of the model. Most software allows the modeling expert to select the observation records reserved for testing purposes, or the software randomly designates some observations as test data. In some software, the model is reconstructed multiple times, and each time a set of randomly selected observation data is reserved for verification. Modeling software also calculates the accuracy of the model using test data.

4.1.5. Conversion of the Results of Modelling into Species Distribution Areas and Mapping

The distribution maps generated by modeling indicate the probability of the species being present at each point forming the study area. The distribution maps generated can summarize the likelihood of the species' presence in different ways:

- "Species distribution maps" consisted of two classes as available-not available,
- Suitability maps,
- Probability maps,
- Maps showing basic distribution borders and marginal distribution borders.

The conversion of the suitability surfaces with modeling output into species distribution areas requires the determination of a threshold value that will indicate the presence of the species. Areas with suitability values above this threshold value are considered as the distribution area of the species.

The method used to determine this threshold depends on the accuracy of the data and location, as well as the purpose of modeling. Some of the modeling software calculates a set of threshold values for different purposes and outputs them with the model created.

Some of the most commonly used threshold values and some situations in which their use may be appropriate include:

Presence of minimum training location: It is the suitability value of the location with the lowest suitability value among all records in the training set. This method provides the most realistic distribution area, especially when data reliability and location accuracy is high. For example, this threshold value can be used when determining the area for the studies to be conducted to determine the presence of a species.

10% training presence: It is the threshold value determined to include 10% of the recording locations in the training set. In species conservation activities carried out under limited facilities, this threshold may be used to determine the most suitable areas for the species.

Equal training sensitivity and specificity: It is the threshold value that provides the training set where the sensitivity of the model to environmental variables is equal to the specificity of the model to the working area conditions. It can be used in modeling studies for conservation planning with relatively reliable data.

These are the most commonly used methods during integration works. However, the conditions for selecting the threshold value determination method differ greatly from one modeling study to another and are determined by the combination of many factors. Therefore, the threshold value method should be determined separately for each species

by the species group specialist and the modeling specialist. The model of *caracal caracal*, produced for the integration study of Köyceğiz Forestry Enterprise Directorate and for which the suitability maps prepared by cutting the model outputs according to the different thresholds mentioned above are given below. (Figure 9).

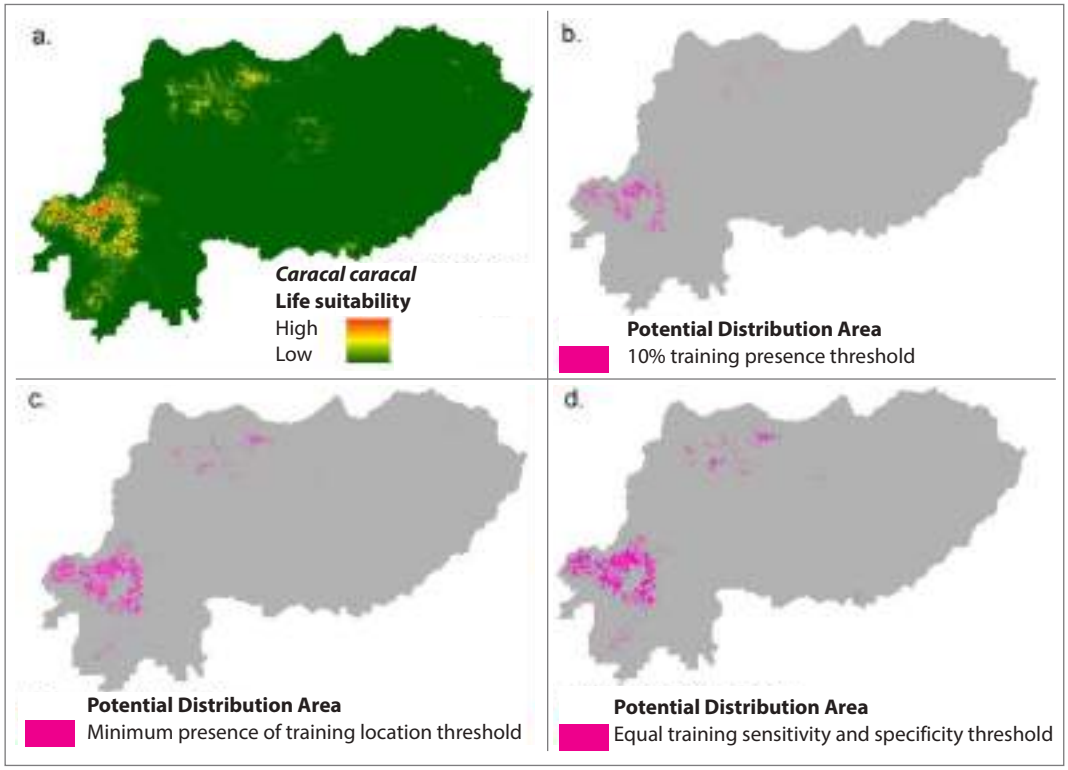


Figure 9. An example showing the conversion of modeling outputs for caracal to a potential distribution area.

The results of Maxent modeling for Köyceğiz Forestry Enterprise Directorate are given in Figure 9.a as the lowest 0 and the highest 1. The cut-off of this model result according to the 10% training presence threshold (threshold value: 0.500) is shown in Figure 9.b, the cut-off according to the minimum training location presence threshold (threshold value: 0.313) is given in Figure 9.c and equal training sensitivity and specificity cut-off according to the threshold (threshold value: 0.313) is given in Figure 9.d. These results are evaluated by modeling experts and the most appropriate threshold is chosen for the potential distribution area of the species.

4.1.6. Writing a Modelling Report

The report on modeling work should contain the following information:

- Number of records suitable for each type, modeling technique and software used,
- Modeling success criteria for each type,
- Map of habitat suitability for each species,
- Map of potential distribution area for each species.

In addition, the potential distribution layer for each species is added to the modeling report to be used to create conservation priority areas.

© Uğur Zeydanlı

4.2. Identifying Conservation Priority Areas

The purpose of this stage is to identify areas of conservation priority (strict conservation and limited implementation zones) that are important for biodiversity and / or require specific practices. Conservation priority areas are areas with similar implementation requirements within themselves and showing spatial continuity to the extent possible. When identifying these areas, information on the distribution of species with conservation priority and information on other areas of biodiversity are used together.

Conservation priority areas include *strict conservation zones* whose primary function is conservation, and *limited implementation zones* with basic functions of conservation for habitat management aiming to create a buffer around the strict conservation zones (Table 5). The main feature of these areas is that they cover a certain magnitude of the distribution of species with conservation priority in the Enterprise Directorate (for example, 10% of the distribution area of the species with conservation priority should be in the strict conservation zone, or 5% should be in the limited implementation zone) and that they cover all areas of OEB. How much of the distribution area of the priority species (such as 5% or 10%) should be included in the strict conservation zone and how much should be included in the limited implementation zone is determined by the "representation target" determined for these species.

Conservation priority areas should be created according to the following criteria and principles:

- Areas with other elements of biological diversity and areas with species with conservation priority likely to be affected by the intervention should be separated as strict conservation zones.
- Some of the areas with species with conservation priority that can tolerate limited forestry practices can be identified as limited implementation zones.
- It is preferred that both strict conservation zones and limited implementation zones be as small as possible.
- Strict conservation zones should consist of adjacent areas as much as possible.
- Strict conservation zones should consist of areas that are less suitable for production activities as much as possible. Thus, production activities are less constrained and long-term conservation success is ensured as protection activities will not conflict with operational objectives.
- Limited implementation zones should, as far as possible, create a buffer around strict conservation zones and areas with protection status (e.g. national parks).
- Efforts should be made to ensure limited implementation zones contain areas to form corridors between strict conservation areas.
- 100% of the representation targets for biodiversity should be achieved.
- The borders of conservation priority zones (strict conservation and limited implementation zones) should be established in such a way as to facilitate the integration into the plans (for example, they should be based on sub-compartments as much as possible or natural boundaries included in the stand plan).

  The details of the methodology and process to be used for the identification of conservation priority zones will vary according to the geographical, topographic, climatic characteristics of the Enterprise Directorate and the diversity of habitat requirements of species with conservation priority. However, the main stages described in the following sections should be performed within the scope of the studies.

4.2.1. Identifying the Density of Biodiversity Elements with Conservation Priority

The density of biodiversity elements is the number of biodiversity elements at any point. This information is obtained by overlapping the distribution of all elements on GIS (see Sections 4.5.1.1 and 4.5.2.1 for examples).

The degree of overlap of the distribution of biodiversity elements is related to the degree of overlap of habitat preferences of conservation priority elements and therefore varies greatly from region to region. The density pattern that demonstrates this degree of overlap is used to determine the method to be followed in the identification of conservation priority zones and creation of these areas.

4.2.2. Setting Representation Targets for Biodiversity Elements with Conservation Priority

Representation targets for each biodiversity element (species with conservation priority and OEB) are determined by species group experts and the biodiversity study coordinator. At this stage, experts first assess the population dynamics, how they are affected by forestry activities, the extent to which they are located in the region and in general, the intensity of these areas, the extent to which they are endangered, and their observations from field studies. The main guideline here is that the number of populations that support the species to survive in the region and the size of their habitat can be covered by the designated target area.

The general criteria to be met when setting representation targets are:

- Representation target is determined in terms of the ratio of the total distribution area of the biodiversity element within the Enterprise Directorate. Furthermore, for some species that require large areas, the representation target can also be determined directly in terms of minimum area and / or population number.
- Two separate representation targets are given: strict conservation zones and the sum of both conservation priority zones. For biodiversity elements that must be included in the strict conservation zone, representation target is set only for the strict conservation zone. For other elements, an overall target is set - this representation target can be achieved in strict conservation zones, limited implementation zones, or in the total of the two.

· The basic criterion is the determination of representation target required for the sustainability of population dynamics, evolutionary and ecological processes within the Enterprise Directorate. After assessing how these dynamics and processes are affected by the practices specific to each conservation priority zone, representation targets are set.

· For other elements of biodiversity, they are intended to be included in strict conservation zones as much as possible, as they form an umbrella for other elements of biodiversity that are not considered as a species with conservation priority, are of particular importance for the region, and often do not have a large total area. However, where this is not possible, efforts are made to support their representation in limited implementation zones.

· For species with conservation priority, the general rule is a minimum 10% representation target. If the species is not a highly threatened species (where the IUCN threat category is LC or VU) and is widespread within the Enterprise Directorate, the representation target can be reduced by up to 5%. However, for species to be evaluated primarily in strict conservation areas (see Section 4.2.3.), the representation target should not fall below 10% and should be kept as high as possible.

As a result of this study, the target representation numbers are determined for each biodiversity element in strict conservation and limited implementation zones and a "Representation Target Table" is created as shown in Table 5. For each element, the target of representation in proportion to the distribution area within the Enterprise Directorate must be specified. Where protection is not included in the list of priority species given in Annex 7, but other species have been decided to be included in the integration during the studies, representative objectives are also set for them (see Sections 4.5.1.2 and 4.5.2.2 for examples of previous studies). If there are other species decided to be included in the integration during the studies although not present in the species with conservation priority list provided in ANNEX 7, representation targets are set for them (for examples of previous studies, see Sections 4.5.1.2. and 4.5.2.2.).

Table 5. Structure of the Table of Representation Target

Name of the Species with Conservation Priority	Total Size of the Distribution Area in the Enterprise Directorate (ha)	Representation target for strict conservation zones (%)	Representation target for limited implementation zones (%)

4.2.3. Defining Strict Conservation Zones

The main criteria to be considered when determining strict conservation areas and borders should be:

· 100% of the representation targets should be achieved,

· The objectives of representation should be achieved in an area as small as possible,

· These areas should be as close as possible to each other,

· These areas should be selected from areas that are less suitable for production activities as far as practicable (for less restriction of production activities),

· The boundaries of these areas should be determined to facilitate the integration of the plans (e.g., based on sub-compartments included in the stand plan or natural boundaries).

· These areas should be selected from areas with official status (national parks, nature parks, wildlife development areas, conservation forests, gene conservation forests, etc.).

· All areas where the OEB are present and the representation targets (a defined proportion of species' distribution areas, for example 10%) of species with conservation priority to which the following conditions apply should be included in strict conservation zones:

  · Highly threatened (species with IUCN threat category CR, EN or VU), and

  · Species that almost completely contradict forestry activities or,

  · Species that are only affected adversely by large-scale, standard production activities and have a narrow distribution within the Enterprise Directorates.

Decisions on these conditions are made by species group experts and the biodiversity coordinator. The last column of the table listing species with conservation priority in ANNEX 7 show species that are expected to be addressed in strict conservation zones and limited implementation zones, according to assessments on a national scale. Representation targets to be used for strict conservation zones can be also set for other species not included in this list but which have been decided to be included in the integration process.

Spatial optimization software is used to address all the criteria for the creation of strict conservation areas. The content of the studies to be carried out at this stage may vary depending on the optimization software used and the method applied. However, the main steps are in the following format (see Sections 4.5.1.3 and 4.5.1.4 and 4.5.2.3 and 4.5.2.4 for examples).

Fazıla's Lycian Salamander *(Lyciasalamandra fazilae)*
© Michael Frenzen

(*Cytisus gueneri*)
© Hayri Duman & Zeki Aytaç

Great spotted woodpecker
(Dendrocopos major) © Ahmet Karataş

1. *Formation of standard operating units:* Standard operating units are the units to be based on optimization.
   - It is preferable that these units are equal or close in size for optimization to be carried out correctly.
   - The size of the units may vary depending on the resolution of other data sources, but generally units of 1km should be preferred.
   - These units are usually hexagonal or square. Stand sub-compartments can also be used as standard operating units for ease of transfer directly to plans. However, their use requires an experienced specialist.
   - The Enterprise Directorate is divided into standard working units of defined size and form.

2. *Calculation of areas of biodiversity within standard working units:* For all diversity elements, the total distribution areas within each standard operating unit are calculated and tables are created in the appropriate input format for the optimization software.

3. *Determination of "costs for standard operating units:* Since reducing the overlap of strict conservation areas and areas to be subject to production activities will increase the applicability of conservation, it is preferable that these areas are selected from areas less suitable for production activities. In order for the optimization process to proceed in accordance with this preference, the areas that are suitable for production are defined as the areas with the highest cost. In forest areas, this cost can be given, for example, as an increased cost in proportion to the increased crown closure.

4. *Optimization process:* At this stage, with the help of spatial optimization software, the optimum set of standard operating units is determined in order to achieve the representation target in accordance with given criteria.
   - Criteria for optimization are the achievement of the representation targets, the selection of few areas, the high completeness of the selected areas and the low total cost.
   - The optimization process is the process of identifying the units that will most effectively complete the standard work units with biodiversity elements with a 100% representation target. In short, we can say that the highest representation is achieved in the least.
   - In order to determine the most appropriate values for the parameters and variables given as input to the optimization software, trials should be performed, and the results should be analyzed, and the most accurate values should be determined.

5. *Drawing the borders of the strict conservation zones:* The borders of the areas composed of the standard working units selected through optimization are rearranged in order to facilitate the planning and implementation phases, so as not to reduce the rate of achieving the representation targets. This arrangement is based on the following layers and borders.
   - The distribution areas of the species considered within the strict conservation zones (see Section 4.2.2.),
   - Stand compartment borders,
   - Topographic structure (natural borders such as streams, ridge).

As a result of these studies, borders of strict conservation zones are created as appropriate to the existing compartment borders. In the event of a discrepancy between the borders and the sub-compartments, the sub-compartments, any part of which is within the strict conservation zone, are included in this area. In rare cases, division of the sub-compartments is recommended.

4.2.4. Defining Limited Implementation Zones

The main criteria for determining these zones should be:

- Achieving 100% representation targets,
- Limited implementation zones should create a buffer around strict conservation areas and areas with protection status,
- Determination of limited implementation zones in a way that they form corridors between strict conservation zones,
- Selection of adjacent / neighboring sub-compartments as far as practicable for species affected by forestry practices in different forms and / or times.

In all studies related to limited implementation zones, compartment is used as the standard operating unit. The main steps of the work to be carried out at this stage are as follows (see Sections 4.5.1.3 and 4.5.1.4 and 4.5.2.3 and 4.5.2.4 for examples):

1. *Separation of species with conservation priority into groups based on forestry practices recommended for their habitat requirements and OEB:* For species with similar habitat requirements and similar forest practices recommendations, representation targets should be achieved in the same areas (sub-compartments and / or compartment groups). For this reason, species with conservation priority and OEB are grouped for the Enterprise Directorate. Table 6 presents critical habitat needs of the species and periods in which forestry practices should be limited. For OEB, there is no time limit and recommendations are developed according to the characteristics of the elements (see Chapter 3) and the conditions of the area in which they are present. This table and more detailed information in the "Practitioner's Guide" is used for grouping. With the help of species experts, the grouping is carried out by evaluating site-specific conditions. As the OEB cover larger areas, they are added to the species groups and overlapped. As a result of grouping, "groups of limited implementation zones" consisting of species and OEB to be included in the same sub-compartments are obtained.

2. *Calculation of the distribution of species and OEB within each compartment:* For each species, the size of distribution areas remaining within each compartment is calculated.

3. *Determination of representation targets for limited implementation zones:* How much of the distribution areas within the Enterprise Directorate remains within strict conservation zones is calculated for each species and OEB. This ratio is compared to the total representation target (see Section 4.2.2). For limited implementation zones, the representation target equals the difference between the total representation target and the representation achieved in the strict conservation zones.

Table 6. Time limitations on species with conservation priority of which representation goals can be identified and their critical habitat needs.

Species Group	Scientific Name	The Months When Forestry Practices are Limited												Characteristics of Forest Habitats That the Species Need and Therefore Need To Be Protected (For further information see "Practitioner's Guide".)	
		1	2	3	4	5	6	7	8	9	10	11	12		
Large mammal	*Capreolus capreolus*			■	■	■	■	■						Dense undergrowth (bush, shrub, grassy cover)	Glades and openings on the forest edge, scrub
	Cervus elaphus					■	■							Dense undergrowth (bush, shrub, grassy cover)	Glades and openings on the forest edge
	Ursus arctos		■	■	■	■	■	■						Habitat diversity	Lack of intense human activity
	Canis lupus				■	■	■							Habitat diversity	Lack of intense human activity
Small mammal	*Chionomys roberti*					■	■	■	■	■				Moist, stony, high grassy and shrub cover	Glades and openings on the forest edge
	Talpa levantis					■	■	■	■	■				Moist soil, grassy cover	Glades and openings on the forest edge
	Talpa caucasica					■	■	■	■	■				Moist soil, aquatic areas and grassy cover	Glades and openings on the forest edge
	Microtus majori				■	■	■	■	■	■				Moist soil, aquatic areas and grassy cover	Glades and openings on the forest edge, scrub
Bird	*Dendrocopos leucotos*				■	■	■							Broad-leaved old-growth forest	Dry, hollow trees and fallen trees. Natural litter such as branches, leaves.
	Dryocopus martius		■	■	■	■	■							Large, coniferous or mixed, aged large, and natural forests containing dry trees with hollows	Lack of intense human activity
	Accipiter gentilis			■	■	■	■	■	■	■				Forest with a degree of 2-3 Crown closure and glades	Lack of intense human activity
	Dendrocopos major	■	■	■	■	■	■							Forest with a degree of 2-3 Crown closure	Dry, hollow trees and fallen trees. Natural litter such as branches, leaves.
Reptiles and Amphibians	*Mertensiella caucasica*			■	■									Slow flowing clean in-forest and forest-edge streams	Meadows and rocky areas near the river. Natural litter such as branches, leaves.
	Lyciasalamandra luschani	■	■	■				■	■	■				Natural stony-rocky cover	Glades and openings on the forest edge
Butterfly	*Zerynthia caucasica*					■	■	■						Presence of host plant and high humidity	Glades and openings on the forest edge, scrub
	Thecla betulae							■	■	■	■			Broad-leaved forests and woodlands housing host plants. Especially wild plums and ash trees.	Glades and openings on the forest edge, scrub
	Zerynthia polyxena				■	■	■							Forests home to host plant and dense undergrowth cover	Glades and openings on the forest edge, scrub
	Lycaena ottomana				■	■	■	■	■	■				Wet and humid broad-leaved forests and maquis that host the host plant	Glades and openings on the forest edge
	Melanargia wiskotti					■	■							Pine forests, rich maquis areas and diversity of plant species	Glades and openings on the forest edge
	Boloria euphrosyne					■	■	■	■					Moist forests and meadows with host plants (where moisture-loving vegetation is present, such as fern)	Glades and openings on the forest edge, scrub

Northern goshawk
(*Accipiter gentilis*)
© Olcay Odabaş

Grecian Copper
(*Lycaena ottomana*)
© Hakan Yıldırım

Caucasian Salamander
(*Mertensiella caucasica*)
© Deniz Özüt

4. *Creating limited implementation zones to act as buffers:* All sub-compartments, any part of which is adjacent to strict conservation areas or areas with protection status, are included in the limited implementation zone taking into account the natural boundaries. While conducting this study, criteria such as habitat suitability, representation target, and cost should be considered for species with conservation priority. For OEB, representation targets should be taken into consideration.

5. *Forming limited implementation zones acting as corridors:* Corridors shall be established between strict conservation zones; between strict conservation areas and areas with protection status; and between areas with protection status with respect to the following approaches. The width of the corridor consists of a minimum compartment, but is preferred to be wider. Sub-compartments to form the corridors are selected according to the following factors:
   - Sub-compartments with the highest species richness are preferred.
   - The distribution areas of species with conservation priority and habitat suitability layers created during modeling studies are also utilized. Areas with the highest habitat suitability are preferred for species with conservation priority.
   - The places where the connection between the OEB can be achieved are preferred as corridors.
   - There should be no barriers (rivers, mountains, wide roads, etc.) on the corridors to prevent the passage of species with conservation priority. Which structures form a geographical barrier is determined by species group experts.
   - The cost factor should be considered.

6. Buffer areas and corridors together form the "draft limited implementation zones".

7. *Division of draft limited implementation zones into sub-regions:* The main principles and methods in this zoning are as follows:

- The main objective is that each compartment contributes to the representation target of species and OEB (groups of limited areas of implementation) only with similar implementation requirements.
- Sub-compartments, which contribute to the representation target of species and OEB with similar implementation requirements and which form sub-regions are intended to be as contiguous as possible.
- Optimization software can be used to determine sub-regions.
- The sub-regions only in draft limited implementation zones should be used when determining sub-regions. Sub-regions are identified for species with similar types of habitat requirements and periodic constraints, and for groups composed of OEB to be developed for similar forestry practices (groups of limited implementation zones described in Article 1). Sub-compartments are identified for each group that allow the representation targets to be reached in the least and most contiguous areas possible. These sub-compartments form the implementation sub-regions. For species and OEB, the rates of reaching the representation targets in the sub-region in which they are included are calculated.
- If, for example, "3 limited implementation zones species groups" have been identified as a result of the grouping, the sub-regions where these groups will be included are determined using the following method:
  - By using sub-compartments only located in the draft limited implementation zones, the sub-compartments that contribute to the achievement of the representation targets of the species and / or OEB of the 1st group (in the 1st type limited implementation zones group) in the smallest and most contiguous areas are identified. These sub-compartments form the 1st implementation sub-region. For the 1st group types and / or OEB, the rates of achievement of the representative targets in this sub-region are calculated.
  - By using sub-compartments only located in draft limited implementation zones, but not selected for species and/ or OEB in the 1st group, the sub-compartments that contribute to the achievement of the representation targets of the species and/or OEB of the 2nd group in the smallest and most contiguous areas are identified. These sub-compartments form the 2nd implementation sub-region. For the 2nd group types and / or OEB, the rates of achievement of representation targets in this sub-region are calculated.
  - By using sub-compartments only located in draft limited implementation zones, but not selected for species and/ or OEB in the 1st and 2nd group, the sub-compartments that contribute to the achievement of the representation targets of the species and/or OEB of the 3rd group in the smallest and most contiguous areas are identified. These sub-compartments form the 3rd implementation sub-region. For the 3rd group types and / or OEB, the rates of achievement of representation targets in this sub-region are calculated.

If more than three groups are identified, the compartment determination process for the other groups is conducted by using the same method.

Figure 10 shows the sub-zoning work carried out in the integration work of Andırın Forest Enterprise Directorate. In the Directorate, limited implementation zones are divided into 5 sub-regions. These are:

Sub-region 1: Areas with high species richness.

Sub-region 2: Natural beech stands and some species with conservation priority

Sub-region 3: Distribution of *Polyommatus alibali*, a conservation priority butterfly species

Sub-region 4: Natural old-growth forests and some species with conservation priority

Sub-region 5: Distribution of brown bear, a conservation priority large mammal species

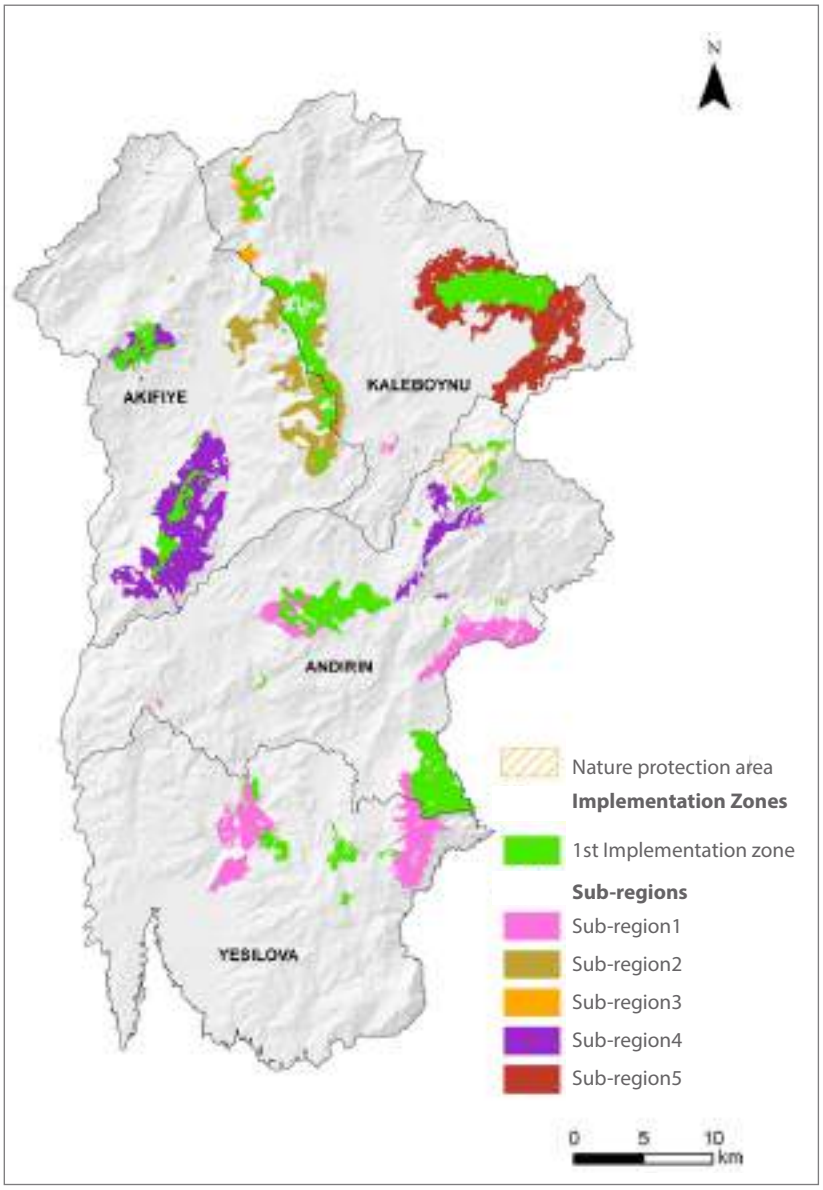


Figure 10. Zoning study in Andırın Forest Enterprise Directorate limited implementation zones.

8. *Achieving the representation targets:* If the representation targets have not been achieved, new sub-compartments shall be added to the draft limited implementation zones until these targets are achieved. Sub-compartments are selected individually (without the use of optimization software) according to the following criteria:
   - For the species whose representation targets cannot be achieved, sub-compartments which are adjacent to the sub-compartments facing each other and included in the-subregion are preferred.
   - Sub-compartments that are the richest in terms of species and OEB with similar implementation requirements and whose representation targets have not been achieved are preferred.
   - Sub-compartments that create new corridors or reinforce existing corridors between strict conservation areas are preferred.
   - Sub-compartments adjacent to the present limited implementation zones are preferred.
   - The distribution areas of the species whose representation targets cannot be reached are utilized. Sub-compartments with wider distribution areas are preferred.

© Uğur Zeydanlı

4.3. Assessment of the Conservation Priority Areas

The conservation priority areas obtained as the result of the land and office works will be evaluated and finalized in a meeting with the Enterprise Directorate. What will be done before and during this meeting are given below.

4.3.1. Preparatory Works

In order to evaluate conservation priority areas with the Enterprise Directorate, conservation priority areas are analyzed in terms of the spread of conservation-priority biodiversity elements. What sub-compartment hold which biological diversity elements, what is the spatial contribution made by that sub-compartment to the conservation objective of biological diversity element, what are the possible constraints, etc.? The information obtained as the result of these analyses are reported in digital and/or printed tables. This information is also processed into the database of the sub-compartment layer. These tables and layers are updated as the result of each assessment resulting in changes to the conservation priority areas.

In order to be used both during the assessments carried out in cooperation with the Enterprise Directorate and at the phase of the use of the outputs in the forestry plan, the tables and layers that should be generated regarding conservation priority areas are as follows:

Conservation Priority Areas Table: This table contains information regarding the status of each species and element of OEB within strict conservation and limited implementation zones. The table should be prepared both in digital and printed form. For each species, it is the table showing the spread area in strict conservation and limited implementation zones and their ratio to the total spread area within the Enterprise Directorate. In case that sub-regions are specified for limited implementation zones, the areas in the entire sub-region are calculated separately. A table is drafted as shown in Table 7. Strict conservation zones should be calculated for all but not for the biodiversity elements considered only in this area. This table also contains information showing the status of reaching representation objectives for strict conservation and limited implementation zones. The rates of reaching of representation objectives in strict conservation zones should be calculated for all but not for the biodiversity elements considered only in this area. In case that sub-regions are specified for limited implementation zones, the target achievement rates are calculated using only the amount of representation realized in the sub-region in the group to which the species belongs (see Chapter 4.5 for examples generated as the result of the previous studies).

Table 7. Structure of the table of representation amounts in fields (values for limited implementation zones must be calculated separately for each sub-region).

Name of the biodiversity element	Representation amounts in strict conservation zones			Representation amounts in limited implementation zones			
				Sub-region group to which the biodiversity element belongs	Sub-region 1		
	Area (ha)	Ratio to total amount within the Enterprise Directorate (%)	Ratio of achieving representation objectives in strict conservation zones (%)		Area (ha)	Ratio to total amount within the Enterprise Directorate (%)	Ratio of achieving representation objectives in strict conservation and limited implementation zones (%)

Sub-compartment Tables: These tables are tables containing information regarding the status of each species and the OEB within each of the available sub-compartments, and if the sub-compartment is included in a field, regarding it. These tables' rows have sub-compartments and columns species and OEB. Tables regarding to all sub-compartments within the Enterprise Directorate (tables defined in the articles a, b and c below) should be prepared digitally, and the table regarding to the sub-compartments only in the areas (the table defined in article d below) should be prepared both digitally and in printed form. The digital tables can be combined into a single table (Table 8). Rows have sub-compartments and columns have species (see Chapter 4.5 for examples generated as the result of the previous works).

a. *Table of amount in sub-compartments:* The table (digital) showing the amount of each species and the OEB as the spread area within each sub-compartment: Rows have sub-compartments and columns have species and OEB. In addition, the area or limited implementation zones containing the sub-compartments are specified with sub-region number.

b. *Table of ratio in sub-compartments:* The table (digital) showing the ratio of each species and the OEB to total area within the Enterprise Directorate within each sub-compartment: Rows have sub-compartments and columns have species and OEB. In addition, the area or limited implementation zones containing the sub-compartments are specified with sub-region number.

c. *Table of existence in sub-compartments:* The table (digital) showing the existence of each species and OEB within each sub-compartment: Rows have sub-compartments and columns have species and OEB. In addition, the area or limited implementation zones containing the sub-compartments are specified with sub-region number.

d. *Table of existence in area sub-compartments:* The table (printed) showing the existence of each species and OEB in all sub-compartments included in any area: Rows have sub-compartments and columns have species and OEB. In addition, the area or limited implementation zones containing the sub-compartments are specified with sub-region number.

Table 8. Sub-compartment tables.

Compartment no	Stand type	Stand area (ha)	Conservation priority area name	Conservation priority area (Strict conservation/ Limited implementation zones)	Sub-region number

Layer of conservation priority areas: In this layer, each sub-compartment forms a separate polygon. The database contains information on existence of each species in a sub-compartment and on in which area the compartment and sub-region exists, and also all stand information (see Chapter 4.5 for examples generated as the result of the previous works).

The results tables are added to the biodiversity study results report, both digitally and in printed form. The digital *.shp files of the generated GIS layers are added to the CD submitted in the annex of the results report.

4.3.2. Meeting for Assessment

As the result of the biodiversity study, a meeting is held with the relevant Enterprise Directorate officials to assess and finalize the conservation priority area map drawn up in order to meet the conservation targets determined for biodiversity elements. Within the scope of the meeting:

The following items will be assessed:

1. Finalizing the limits by adding new sub-compartments or removing some sub-compartments from/to area,

2. What would be the limits in the plan by assessing all the introduction pages for species with conservation priority containing the information such as forestry practices according to the species and other elements in the strict conservation and limited implementation zones (see Practioner's Guide).

During this study, the problems related to strict conservation and limited implementation zones should be examined according to the draft map of priority areas and it should be checked whether there are any constraints such as "permit-servitude" previously given, social pressures etc. Existing or planned road opening or extension works should also be examined and assessed in term of conservation priority areas.

Draft conservation priority areas map is finalized as the output of the study and "Biodiversity Conservation Priority Area Map" is generated. This map will be used directly by the forestry committee in the forestry plans to be drafted in the following year. Restrictions on species with conservation priority and other elements in the relevant areas are discussed and it is ensured that the Enterprise Directorate and District Directorate officials who will implement the plan in the future are informed about these constraints.

At the end of this meeting held by the team of experts and the Enterprise Directorate, the final form of the biodiversity conservation priority area map is agreed. During the workshop, the conservation objectives of the biodiversity elements are recalculated, taking into consideration the areas that are added and removed to/from the strict conservation and limited implementation zones on the draft map of conservation priority areas. For this, the new conservation priority area map and the spread map of biodiversity elements are re-intersected in the GIS environment. In case that the spatial targets for biodiversity components have not been reached as the result of this intersection, new areas are identified to meet these objectives and added to the map of conservation priority areas.

As the result of the meeting,

The following is processed into conservation priority areas map and finalized

1. Changes recommended by Enterprise Directorate to meet other forestry functions (financial and social) and consider the restrictions such as social pressure (areas added or removed to/from draft map of conservation priority areas) and,

2. Changes to meet the biodiversity conservation targets.

According to this final form, the tables explained in Chapter 4.3 is arranged and their final form is given. Using the maps and tables obtained, the result report of the biodiversity assessment is written and submitted to Enterprise Directorate.

4.4. Writing Implementation Prescriptions for Limited Implementation Zones

After the conservation priority areas are determined, implementation prescriptions are prepared for the priority areas out of the strict conservation zone where limited implementations can be made. When preparing prescriptions, it is determined which elements (species with conservation priority and other elements of biodiversity) co-exist on the basis of sub-compartments and prescriptions are based on the characteristics of these elements such as common living-environment requirements and temporal constraints. The following steps outline how to prepare prescriptions for areas designated for a Forestry Sub-District Directorate and reserved for limited practices.

1. A stand table is generated, which includes the sub-compartments within the limited implementation zones and the elements contained in these sub-compartments. This table is prepared by GIS-Modelling experts in GIS environment and converted into excel file. In this table, there are also the elements of biological diversity (such as species, ecological process) in that sub-compartment as well as the stand type information of each sub-compartment.

2. For each biodiversity sub-component, the following information is compiled into a table (Table 9):

   a. Implementation constraints and measures that take into consideration the requirements of the habitat and vulnerabilities,

   b. Conservation measures specific to that element,

   c. Critical periods of the year for that element: breeding, raising etc.

Implementation restrictions for each biodiversity element, specific conservation measures, and critical periods of the year for the species should be specified according to the sample table below.

Table 9. Table on conservation precautions specific to conservations priority species and critical period calendar.

Name of Species	Name of Species	Implementation restrictions	Special conservation precautions	Critical Period Calendar for Species											
				1	2	3	4	5	6	7	8	9	10	11	12

3. By using the stand table, all combinations of biodiversity elements in the sub-compartments reserved for limited practices are determined: A new column is opened in the stand table, which contains the stand type in the rows and biodiversity elements in the columns, and the different elements in each sub-compartment are listed in this column. A prescription is prepared for each of the unique combinations in this column.

4. If the number of prescriptions is above 20, the number of recipes is reduced by combining: It is preferable that the total number of prescriptions to be prepared for each Forest Sub-District Directorate does not exceed 20. If more than 20 prescriptions have been generated, recipes very similar to each other are rewritten as a single recipe and the number of prescriptions is reduced to around 20.

As the result, a prescription table as in Table 10 arises. In Table 10, the number given to the prescription, the species with conservation priority in the stand, the periods during which silvicultural and other forestry practices should be made, the restrictions and precautions to be followed and the information on the special precautions and threats should be indicated in the prescription tables.

Table 10. Table for implementation prescriptions

Prescription Table	Species with Conservation Priority in the Stand	The Periods during which Silvicultural and Other Forestry Practices Should Be Made	The Restrictions and Precautions to Be Followed	The Information on The Special Precautions and Threats

* Implementations should be carried out and completed within the periods specified and no implementation should be made during the rest of the year.

5. Prescription numbers are assigned to the sub-compartments: The prescriptions created are assigned a prescription number and a new column is added to the stand table to indicate which recipe to use for each sub-compartment and the corresponding prescription number is entered in this column (Table 11). In this table, prescriptions are given according to compartment number, stand type, and working group.

Table 11. Table for compartment-prescription number

Compartment No	Stand Type	Working Group	Prescription No

6. Prescription texts and recommendations are integrated into the relevant tables (Table No: 22, 22A, 23, and 28, etc.) where sub-compartments to which the prescription codes are assigned are in the forest management plans.

Following the above steps, the characteristics of species and other elements of biodiversity, the number of elements to be evaluated, the similarities or differences in the habitat requirements of the elements should be taken into consideration. These differences lead to the failure to establish a full standard in the preparation of prescriptions. Therefore, it is appropriate to make the necessary changes in the above steps according to the content of each study.

4.5. Examples of Biodiversity Assessment

In this chapter, examples for integration of biological diversity into forest management plans are given. The integration activities carried out at Şavşat Enterprise Directorate under Artvin District Directorate and Gazipaşa Forestry Enterprise Directorate under Antalya Forestry District Directorate are taken as examples. Information about the examples is given in the framework of the steps of this method.

4.5.1. Şavşat Forest Enterprise Directorate as an Example

4.5.1.1. Identifying Densities of the Biodiversity Elements with Conservation Priority

In the studies carried out in Şavşat Forest Enterprise Directorate, 12 species and 4 OEB were evaluated.

Şavşat as an example: In the biodiversity assessment carried out in the region, the existence of similar habitat preferences of the biodiversity elements considered resulted in a degree of overlap. However, areas where a large number of species overlap have emerged in distant regions, and due to the geographical structure of the region, these overlap areas have not shown a continuity and have established sprawl. (In the map in Figure 11, changing from green to red shows increase in the density of conservation priority biodiversity elements).

© Uğur Zeydanlı

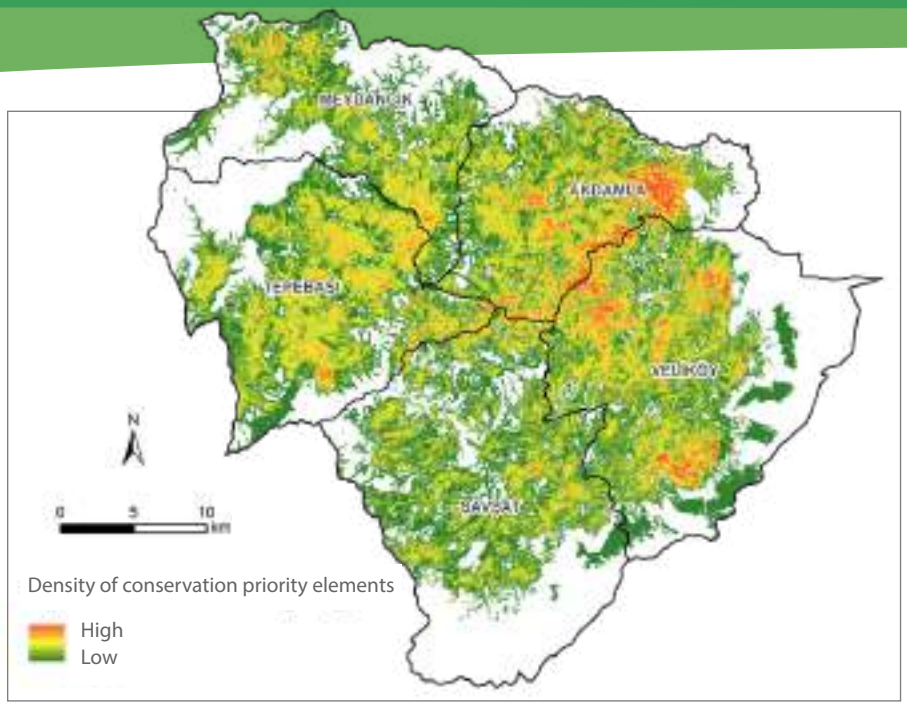


Figure 11. Density of conservation priority elements for Şavşat.

(*Boloria euphrosyne*)

© Soner Bayhan

4.5.1.2. Identifying the Biodiversity Elements Needed to Be Assessed in Strict Conservation Zones and Setting Goals of Representation

Şavşat as an example: 5 species have been evaluated with priority in strict conservation zones. All areas where the OEB are located are in strict conservation zones. The targets for the strict conservation zones were set between 5% and 80% and the representation targets for both conservation priority areas were determined as 5% to 100% (Table 12).

Table 12. Species representation targets for Şavşat study.

Species with Conservation Priority	Total area of enterprise directorate	Representation target for strict conservation zones (%)	Total representation target for strict conservation and limited implementation zones (%)
Aegypius monachus	3443,06	0	50
Aquila heliaca	27167,89		0
Betula recurvata	12845,98		0
Boloria euphorsyne	15,69		00
Capreolus capreolus	35698,82		0
Dianthus liboschitzianus	6,28	80	00
Euonymus leiophloea	18926,99		0
Mertensiella caucasica	26278,74		0
Microtus majori	5736,55		
Rhamnus depresus	9,41	80	00
Salix caucasica	3226,95		20
Ursus arctos	32976,09		

4.5.1.3. Identifying Conservation Priority Areas

The strict conservation zone is created by finding the most efficient area set where the requirement for strict conservation zones is met in the minimum area and the limited implementation zone is created around this strict conservation zone. It is the safest method to be followed in regions that do not have unusual characteristics in terms of geographic structure or biodiversity patterns. This method was followed in the example of Savsat (Figure 12).

METHODS

Şavşat as an example:

- MARXAN, an optimization software developed for the identifying strict conservation zones and conservation priority areas, was used. Optimization was used to determine the most efficient set areas where all representation targets were achieved while creating strict conservation zones. As a standard study unit, stand sub-compartment types were used in all stages.
- For each sub-compartment, a cost varying based on closure was assigned (3 closure %50, 2 closure %40, 0 closure %20).
- It was aimed to reach the targets with the lowest possible total cost and in the least possible area.
- When identifying limited implementation zones, strict conservation and sub-compartments around the conservation areas were included.
- Sub-compartments were added to limited implementation zones to form corridors between the strict conservation zones.
- For species whose representation targets in limited implementation zones could not be achieved, new sub-compartments adjacent to the limited implementation zones were added, with priority given to the richest of these species.

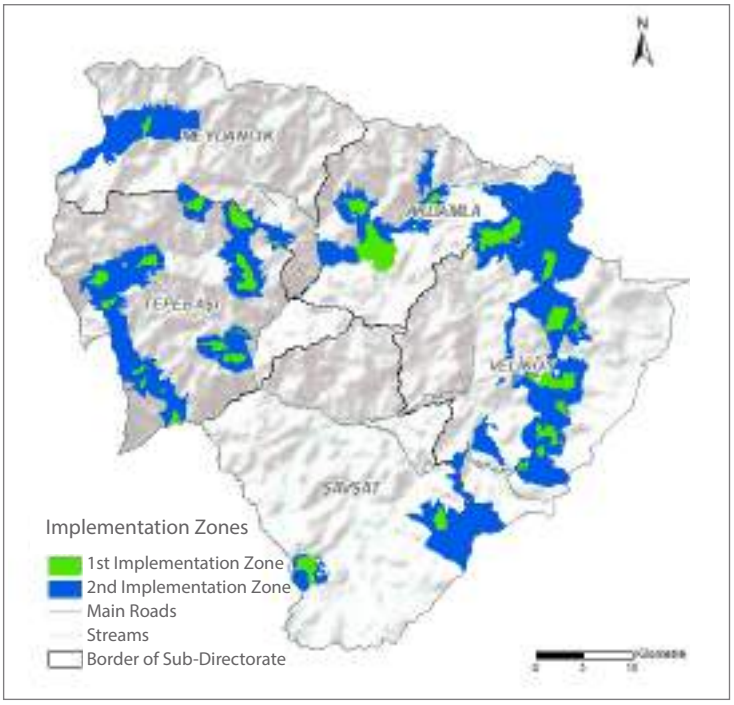


Figure 12. Conservation priority areas for Şavşat

Cinereous Vulture (*Aegypius monachus*)
© İlker Kül

4.5.1.4. Conservation Priority Areas and Sub-Compartment Tables

As a result of the work carried out in Şavşat Enterprise Directorate, the sub-compartment tables were prepared separately for strict conservation and limited implementation zones. The table below shows the sub-compartments, which contains information on the stand and the presence of biodiversity priority elements in each of the stand sub-compartments in the area designated as strict conservation zones as a result of the study conducted in Şavşat Enterprise Directorate (Table 13). This table is the filled form of the table given in Table 5 in the chapters above.

Table 13. Şavşat as an example – Sub-compartment table for strict conservation zones.

Sub-Compartment Information				**Areas of Conservation Priority Biodiversity Elements (m²)**			
DIRECTORATE ID	**NAME OF DIRECTORATE**	**NO OF SUB-COMPARTMENT**	**TYPE OF STAND**	***Ursus arctos***	***Capreolus capreolus***	***Microtus majori***	***Aegypius monachus***
60504	ŞAVŞAT	303	ÇBKBt-1	4461	4324	0	0
60504	ŞAVŞAT	303	Lc2	28075	2256	0	0
60504	ŞAVŞAT	303	ÇBL-1	7612	12485	0	0
60504	ŞAVŞAT	303	ÇBKBt-2	0	73652	0	0
60504	ŞAVŞAT	303	ÇBL-2	0	0	5587	0
60504	ŞAVŞAT	303	Me	1569	5698	0	0
60504	ŞAVŞAT	308	ÇBL	0	0	0	0

As a result of the study carried out in Şavşat Enterprise Directorate, layers were prepared separately for strict conservation and limited implementation zones. The database contains stand information for each of the stand sub-compartments in this area and information on the existence of conservation priority biodiversity elements.


© Deniz Özüt

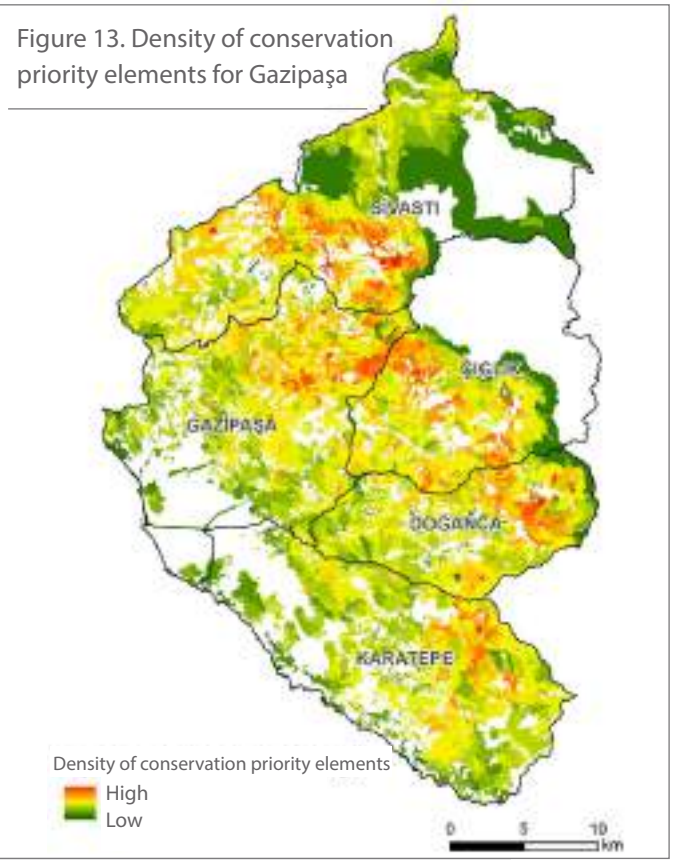
4.5.2. Gazipaşa Forest Enterprise Directorate as an Example

4.5.2.1. Identifying Densities of the Biodiversity Elements with Conservation Priority

51 species (24 fauna species and 27 flora species) and 2 OEB were evaluated in the studies carried out at Gazipaşa Forestry Enterprise Directorate.

Gazipaşa example: In the biodiversity assessment conducted in the region, some of the species with conservation priority studied prefer natural aged forests and the others prefer vertical stratification. Therefore, the areas where many species overlap are very small (the density of conservation priority biodiversity element increases changing from the green to red in the map in Figure 13). In addition, a corridor was created for the wild goat species.

Figure 13. Density of conservation priority elements for Gazipaşa



(*Ophrys holoserica* **subsp.** *heterochila*)
© İsmail Gökhan Deniz

(*Ophrys amanensis* **subsp.** *antalyensis*)
© İsmail Gökhan Deniz

4.5.2.2. Identifying the Biodiversity Elements Needed to Be Assessed in Strict Conservation Zones and Setting Targets of Representation

Gazipaşa as an example: 28 species have been assessed with priority in strict conservation zones. All areas where the OEBs are located are in strict conservation zones. The targets for the conservation priority areas were determined to be between 5% and 100%, and the representation targets for both conservation priority areas were determined to be between 5.6% and 100% (Table 14).

Table 14. Species representation targets for Gazipaşa study.

Species with Conservation Priority	Total area of enterprise directorate	Representation target for strict conservation zones (%)	Total representation target for strict conservation and limited implementation zones (%)
Cephalanthera kotshyana	73,568553	100	100
Ophrys amanensis subsp. ***antalyensis***	135,831945	100	100
Ophrys holoserica subsp. ***heterochila***	4,539262	100	100
Ophrys reinholdii subsp. ***leucotaenia***	133,336833	100	100
Charaxes jasius	318,600758	20	50
Limenitis reducta	786,237978	20	40
Zerynthia cerisy	113,123157	20	80
Lycaena otomana	187,28828	66	100
Canis lupus	42193,72568	5	10
Felis silvestris	2338,103604	5	10
Caracal caracal	47236,32434	5	10
Capra aegagrus	63905,15562	5	10
Lynx lynx	20663,81574	5	10
Sitta krueperi	29793,79427	5	10
Phylloscopus orientalis	9399,382022	10	15
Dendrocopos major	14345,2428	10	15

Species with Conservation Priority	Total area of enterprise directorate	Representation target for strict conservation zones (%)	Total representation target for strict conservation and limited implementation zones (%)
Accipiter gentilis	7399,496579	5	10
Dendrocopos leucotos	27515,02807	5	10
Hystrix indica	47661,46721	5	10
Hypsugo savii	167,046368	33	50
Myotis nattereri	231,288195	33	50
Pipistrellus kuhlii	91,147147	100	100
Rhinolophus earyale	17,752059	100	100
Rhinolophus ferrumequinum	362,597632	20	40
Rhinolophus hipposiderus	199,866189	20	40
Anatololacerta oertzeni	15826,98714	5	10
Lacerta pamphylica	28984,99939	5	10
Lyciasalamandra atifi	25575,2496	5	10

4.5.2.3. Identifying Conservation Priority Areas

The strict conservation zone is created by finding the most efficient area set where the requirement for strict conservation zones is met in the minimum area and the limited implementation zone is created around this strict conservation zone. It is the safest method to be followed in regions that do not have unusual characteristics in terms of geographic structure or biodiversity patterns. This method was followed in the example of Gazipaşa (Figure 14).

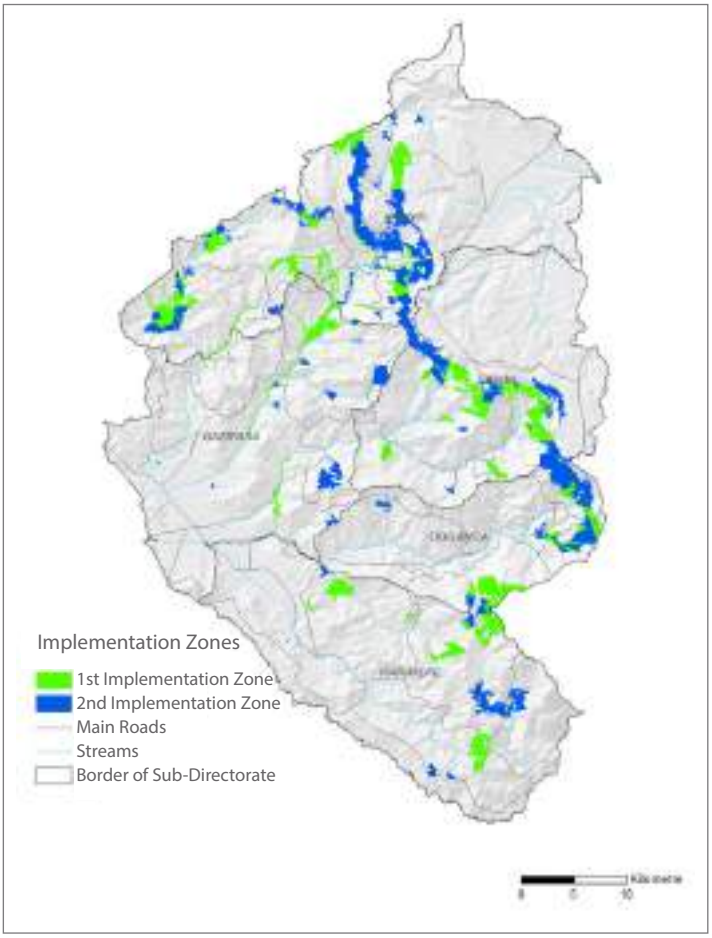
METHODS

Gazipaşa example:

- MARXAN, an optimization software developed for the identifying strict conservation zones and conservation priority areas, was used. As a standard study unit, stand sub-compartment types were used in all stages.
- For each sub-compartment, a cost varying based on the production function was assigned.
- It was aimed to reach the targets with the lowest possible total cost and in the least possible area.
- The distribution of all biodiversity elements was mapped.
- The distributions of the species with conservation priority, which were set as a hundred percent conservation target for the strict conservation zone, were chosen to be added to the strict conservation zone. The representations of the other species in the strict conservation zone were calculated. The areas of the species selected for inclusion in the strict conservation zone and whose representations in the strict conservation zone are calculated may overlap; so, the representation objectives of the species whose representations in the strict conservation zone are calculated may already be met. If these two conditions did not occur, re-selection was made to maintain the representation rates of these species.

- In this step, it is important that the species we aim to conserve are located in the same stand (selection of polygons maximizing the number of species) and close to the currently selected strict conservation zones.
- Limited implementation zones were chosen from the closest to the strict conservation zones and with the most species with conservation priority. Here too, a gradual selection cluster was formed and the limited implementation zone was developed by assessing the rate of species reaching the representative targets in the limited implementation zone.
- Spatial optimization study area was realized by considering different geographical regions and environmental variables.
- During this process, the forest sub-compartments were avoided as much as possible and the sub-compartments which were currently assigned ecological forest function were emphasized.

Figure 14. Conservation priority areas for Gazipaşa



Anadolu sıvacısı (*Sitta krueperi*)
© **Timur Çağlar**

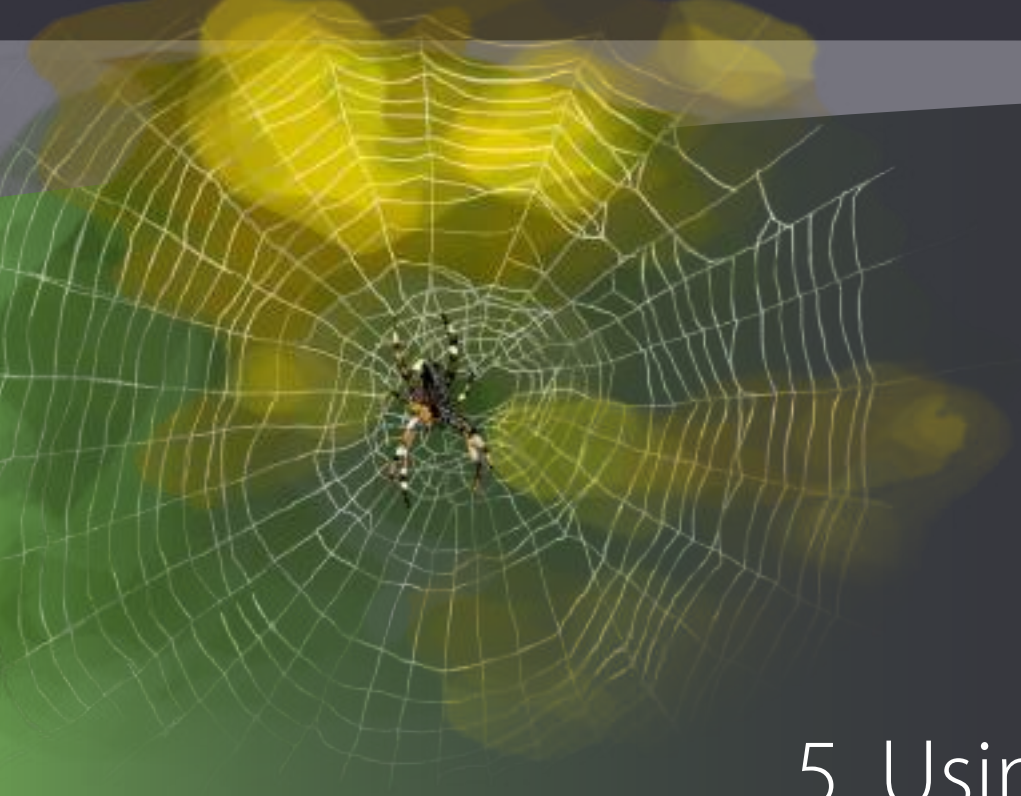
4.5.2.4. Conservation Priority Areas and Sub-Compartment Tables

As a result of the work carried out in Gazipaşa Enterprise Directorate, the sub-compartment tables were prepared separately for strict conservation and limited implementation zones. The table below shows the sub-compartments, which contains information on the stand and the presence of biodiversity priority elements in each of the stand sub-compartments in the area designated as strict conservation zones as a result of the study conducted in Gazipaşa Enterprise Directorate.

Table 15. Gazipaşa as an example – Sub-compartment table for strict conservation zones.

Sub-Compartment Information			**Existence or non-existence data of Conservation Priority Biodiversity Elements**			
NAME OF DIRECTORATE	**NO OF SUB-COMPARTMENT**	**TYPE OF STAND**	***Caracal caracal***	***Capra aegagrus***	***Sitta krueperi***	***Lyciasalamandra atifi***
GAZİPAŞA	73	BÇz	1	1	1	0
GAZİPAŞA	73	Çzd2	1	1	1	0
GAZİPAŞA	73	Çzcd2	1	1	1	1
GAZİPAŞA	73	Çzcd3	1	1	1	0
GAZİPAŞA	74	Çzcd3	1	1	1	1
GAZİPAŞA	74	Çzcd3	1	1	1	0
GAZİPAŞA	74	BÇz	1	1	1	0

As a result of the study carried out in Gazipaşa Enterprise Directorate, layers were prepared separately for strict conservation and limited implementation zones. The database contains stand information for each of the stand sub-compartments in this area and information on the existence of conservation priority biodiversity elements.



5. Using Biodiversity Outputs in Forest Management Planning

The management committee, which will make the new management plan of the Enterprise Directorate, whose biological diversity study has been completed, will make a different planning for conservation priority areas (strict conservation and limited implementation zones).

The main documents to be used by the management committee for the conservation priority areas (strict conservation and limited implementation zones) of the working objectives and groups to be reserved for the areas designated as strict conservation and limited implementation zones in the management plan and the way to be followed in defining the management activities to be carried out in these areas are as follows:

1. Final Report on Biodiversity Study (example table 17): This report is the main output of the biodiversity study carried out in the Enterprise Directorate and the chapters to be used by the forest management committee are stated in this report. These chapters are:

- Chapter 5: Practices and Restrictions for Conservation Priority Areas
- ANNEX 6: Introductory Pages of Species with Conservation Priority
- ANNEX 7: Introductory Pages for Other Elements of Biodiversity
- ANNEX 8: Table Showing Strict Conservation and Limited Implementation Zones and Conservation Priority Biodiversity Elements

2. Chapter 5 of this guide

3. Practitioner's Guide: A guide in which forestry practices for biodiversity elements are assessed in detail.

4. An integration study as an example

The forestry management committee will use these outputs to plan the sub-compartments that fall within strict conservation and limited implementation zones. Planning decisions for these areas should clarify the following:

- Identifying suitable stand structures for the working group where conservation priority areas are reserved for and determining the aimed stand organizations to meet the habitat requirements of the species with conservation priority,
- Determination of arrangement factors such as form of working group (same age or different age), duration of administration or aimed diameter, vertical or horizontal closure,
- Determining the constraints on forestry practices such as temporal, spatial, and implementation types according to the characteristics of conservation priority elements covered by conservation priority areas.

5.1. Arrangements for Conserving Biodiversity in Conservation Priority Areas

As explained in Chapter 4 of the Guide, conservation priority areas are considered within two different conservation categories. The first of them is the conservation priority areas, also referred strict conservation zones. These areas are OEB quality forest areas with high threat categories such as natural old forests and species that will be adversely affected by forestry practices. These areas are also called strict conservation zones and production and human activities should not be allowed in these areas. The areas where limited production can be carried out although there are various conservation elements, which are mostly located around these areas, include limited implementation zones. A production activity should be planned and performed in such a way as to observe the habitat requirements and life cycles of species with conservation priority and other elements in these areas.

In the following chapters, the subjects mentioned below are discussed:

1. Which functions, working aims and working groups to be reserved for strict conservation and limited implementation zones,
2. How to plan the production in the relevant sub-compartments,
3. What information should be included in the operational tables.

5.1.1. Arrangements for Strict Conservation Zones

The characteristics of the conservation priority areas, indicated in green color on the map of conservation priority areas, can be summarized as follows:

- Include species with conservation priority under high threat,
- Contain species with conservation priority that will be significantly affected in forestry practices,
- A large number of species with conservation priority coexist,
- Include some special biodiversity elements such as natural old forests.

Therefore, it is required that no working activities are carried out in these areas and that these areas are not given eta. It is possible to carry out production activities that fall within the extraordinary scope arising out of natural disasters from these areas where it is necessary; however, especially in areas with “natural old forests”, which are other elements of biodiversity, they should not be subject to production arising out of the extraordinary cases. Other forestry such as afforestation, rehabilitation, maintenance, road-widening, opening new roads, etc. out of production should not be carried out in these areas. For practices such as a production etc., outside these areas, roads should not be passed through these areas. These areas, like other forest areas, should be protected against illegal attempts such as illegal lumbering. As it will damage the natural structure of these areas, activities such as exploration and operation of mines and construction of hydroelectric power plant (HEPP) should not be allowed in these areas.

Areas within the strict conservation zone should be separated by the management committee for the working purposes as “Biological Diversity Conservation and Development Areas” and “Areas with High Conservation Value”, whose

main ecological function is the general forest function of nature conservation. As mentioned above, these areas should not be given any eta and should not be subject to practices such as maintenance, afforestation or rehabilitation. Road network plans should be drafted taking these areas into consideration, and an arrangement for passing new roads through these areas or extending the roads passing through these areas should be avoided.

The list of conservation priority biodiversity elements in the strict conservation zones are given in digital form (*.shp file) in the tables to be included in ANNEX 8 of the Results Report of Biodiversity Assessment (see Table 17), which is the main output of the biodiversity study carried out in the relevant Enterprise Directorate and in the digital GIS maps to be given in the annex of the report. In the relevant tables and maps, the presence of species with conservation priority and other elements is indicated as compartment and sub-compartment. In the operational tables (Table No: 22, 22A, 23, and 28, etc.) to be drawn up in the forestry management plan, in the explanation part of each sub-compartment that falls within strict conservation zones it should be stated that this sub-compartment is a conservation area. Again, in the same explanation, it should be noted which conservation priority biodiversity elements are included in this sub-compartment. The information given on Introductory Pages of Species with Conservation Priority and Introductory Pages on Other Elements of Biodiversity should be used for the habitat required by this aimed biodiversity elements (forest type, characteristics etc.) and constraints required by the life cycle.

In summary, in the operational tables, three explanations will be included in the explanation sections of the sub-compartments that fall within the strict conservation zones:

1. Indicating that the sub-compartment is a conservation area and that it will not be subject to any work/production except in exceptional circumstances,
2. Specifying that, if the sub-compartment is designated as a natural old forest, it will not be subject to any work/production even in extraordinary situations,
3. Specifying that the names of the conservation priority biodiversity elements contained in the sub-compartment and information on these elements may be found in the Practitioner's Guide.

5.1.2. Arrangements for Limited Implementation Zones

Limited implementation zones are conservation priority areas that can be subject to limited production due to the nature of the biodiversity elements they cover. These areas should be subject to working prioritizing the conservation of their natural structures due to their species with conservation priority and other elements of biodiversity. Sub-compartments that are reserved as limited implementation zones are also referred to as limited implementation zones, as they are almost entirely determined to enclose strict conservation zones and form a transition or buffer zone.

Sub-compartments within limited implementation zones are the areas where production activities can be carried out considering certain constraints. The information what type of forest species with conservation priority that are distributed in the sub-compartments in the limited implementation zones needs and what kind of elements they need in this forest are given in Introductory Pages of Species with Conservation Priority in the annexes of Results Report of Biodiversity Assessment Study and also in "Practioner's Guide". These pages also provide information on what kind of forestry practices will species with conservation priority be adversely affected and what kind of forestry practices should be considered in areas where species with conservation priority exist.

In limited implementation zones, the general forest function should be "Nature Conservation". The management aim of these areas should be the "Management Aim of Biodiversity Conservation and Development Areas" as in the strict conservation areas. However, unlike strict conservation areas, these areas can be given eta and they can be subject to practices such as maintenance, afforestation, and rehabilitation. However, the amount of eta here, how (such as in which method, which species, in which age trees), when (in which months) and in what way (individual or group selection, the same-aged, with small coupes, etc.) eta to be taken should be determined by considering the subjects such as habitat requirements and production period (see Introductory Pages on Species with Conservation Priority) of biodiversity element (species with conservation priority, high tree species richness, in-forest water source etc.) in this area (sub-compartment). Forestry practices in these areas, which are defined as limited implementation zones, may include practices that will ensure the continuity of a forest habitat with the characteristics required by the biodiversity elements in these areas and will not adversely affect this structure. However, road network plans should be prepared by taking these areas into consideration, and how an arrangement for passing new roads through these areas or extending the roads passing through these areas should be considered regarding how to affect the biodiversity elements in these areas. As a general principle, the opening of new roads through these areas should be avoided as much as possible as the roads adversely affect the habitats of the species and the quality of their habitats.

The conservation priority biodiversity elements in the limited implementation zones are given in digital form (*.shp file) in the tables in the ANNEX 8 of Results Report of Biodiversity Assessment and in the annex of the report. In the relevant tables and maps, the existence of species with conservation priority and other elements is indicated as compartment and sub-compartment. In the operational tables (Table No: 22, 22A, 23, and 28, etc.) to be drawn up in the forestry management plan, in the explanation part of each sub-compartment that falls within limited implementation zone it should be stated that this sub-compartment is a limited production area. Again in the same explanation part, it should be noted which conservation priority biodiversity elements are included in this sub-compartment and also their habitat requirements and the constraints required by life cycle should be stated. The information given on Introductory Pages of Species with Conservation Priority and Introductory Pages on Other Elements of Biodiversity should be used. Among these information, especially information under the titles of Habitats, Seasonal Activity, and Forestry Practices contains the information to be required when taking decisions on limitations to the brought to this sub-compartment (production time, size of production areas etc.) plans on eta (such as characteristics of the habitat needed by the species).

In the planning study, after the production plan of the relevant sub-compartment within the limited implementation zone is prepared, the necessary information should be entered into the operational tables. **In summary, in the operational tables**, the following two explanations will be included in the explanation sections of the sub-compartments within the limited implementation zones:

1. Specifying that sub-compartment will be subject to a limited management/production as it is a conservation priority area,
2. Specifying the prescription code for the sub-compartment,

In addition, recipes prepared in the form described in Chapter 4.4 should include the recipe code, species names, periods of silvicultural and other forestry practices, limitations to be followed and measures and special measures.

5.1.3. Recommendations for the Areas Outside the Strict Conservation and Limited Implementation Zones

Arrangements and implementations in areas other than strict conservation zones and limited implementation zones should also be planned to ensure that biodiversity and the elements supporting the forest ecosystem are not adversely affected by forestry practices. For this purpose, relevant orders, communiqués, and circulars should be utilized (e.g. Communiqué No: 298: Fundamentals of Silvicultural Practices, Communiqué No: 299: Procedures and Principles on Regulation of Ecosystem-Based Functional Forest Management Plans, etc.). The information given on the pages introducing species with conservation priority and OEB can also be a guide in reducing the negative impacts of forestry activities outside conservation priority areas.

In addition to the mentioned above, particular attention should be paid to the sustainability and conservation of the natural structure of water resources, which is an element supporting the whole forest ecosystem. Since the activities that will cause the destruction of the brook vegetation and vegetation around the streams and the decrease of water flow rate will have very negative effects, such activities should be avoided as much as possible. Undesirable effects can either be directly caused by existing activities in this region or may occur outside the region and their effects may reach the region. For example, activities such as cutting, transmission line construction, road construction etc. can lead to destruction of vegetation, erosion, and landslide. The main approach related to aquatic ecosystems is that no cuts are made in the buffer zone around streams, and that roads and other constructions and passage of power and pipe lines are not allowed. The width of this buffer zone should be determined according to the slope of the land and all activities should be planned considering the possible impacts on the lower basin. Furthermore, vegetation renewal works may be carried out in order to prevent erosion, flood, and overflow, provided that it is limited to the areas where the vegetation is severely degraded. However, with these works, the existing aquatic ecosystem should not be disturbed; areas with vegetation such as natural meadows should not be afforested.

In addition, in areas with high mountain ecosystems that are sensitive in terms of forestry practices, a more protective approach should be preferred considering general forestry principles.

5.1.4. Other Arrangements

In addition to the abovementioned subjects, the following information should be integrated into forest management plans:

1. Under "3.2.5. Biodiversity Inventory" chapter of the forest management plans, a brief summary related to the field studies carried out within the context of the integration of biodiversity, general recommendations developed for the identified conservation priority areas, the species in these areas, and the tables to which implementation prescriptions recommended for limited implementation zones are integrated should be written. In order to be added to this section, a Forest Sub-District Directorate map should be prepared with the Latin and Turkish species names of the species registration points taken on the field.
2. A report on species with conservation priority used to identify conservation priority areas should be prepared. In this report, species characteristics for the species and forestry practices proposals developed for the areas where these species are located should be included with species photographs.

5.2. Defining Forest Management Goals and Classes of Strict Conservation and Limited Implementation Zones and Recommendations for Integration into Plans

5.2.1. Entitling Forest Management Classes

FONK 1 of the strict conservation areas is assigned the function of "2123-Areas with High Conservation Value" or "2155-Biodiversity Conservation and Development Areas". The difference is due to the existence of very specific endemic plant species. The code 2123 is assigned to locations where these species are located. In the FONK 2 of the strict conservation areas, "2100 Nature Conservation" conservation targets codes are entered. No silviculture process is offered in the strict conservation zones.

Limited implementation zones are given FONK1 by Forest Management Committee, and "2155-Biodiversity Conservation and Development Areas" conservation target code is entered into FONK2. Silvicultural processes are carried out in accordance with the prescriptions prepared for the sub-compartments in these areas. In addition, management goals of "2116-Alpine Zone", "2124-High-Mountain Forest Ecosystem", "2148-Waterside Conservation Areas", and "3410-Nature Sports Areas" can be given for some special areas. Code 2116 can be assigned for areas with OT and T openings at 2200 meters and higher points, code 2124 for forest areas at 2000 meters and higher points (productive or closed with spaces), or code 2148 for areas adjacent to streams with a slope of more than 45°, and code 3410 for areas with ecotourism potential.

5.2.2. Mapping the Boundaries of Forest Management Classes on Forest Management Plans

"Map of Biodiversity Conservation Priority Areas", whose borders are made certain in the annex of Results Report of Biodiversity Assessment, arranged in digital form in *.shp format, and finalized will be intersected with forest management map and finalized by chief engineer of planning.

5.2.3. Integration into Plans

Under the working goal groups corresponding to the sub-compartments within the conservation priority areas under the chapter "3.2.7. Forest Function Inventory" within the forest management plans, the corresponding conservation zone (strict conservation zone or limited implementation zone), general recommendations developed for such areas, species with conservation priority list detected there, and numbers of such sub-compartments should be given in form of table.

5.3. Issues on the Next Renewal of Plans

A new biodiversity assessment study should be carried out when plans to which biodiversity is integrated are expired and needed to be renewed after 10-20 years. In the biodiversity assessment study to be carried out again, the status of the strict conservation areas identified in the previous plan should be examined and whether the areas retain their characteristics should be studied. The areas that retain their characteristics should be identified as strict conservation areas in the new plan and their continuity should be ensured.

The biodiversity assessment study to be carried out in the next plan renewal should be designed to monitor the positive and negative impacts of the implementation of previous plan on biodiversity. During the plan period, conservation priority areas where biodiversity is adversely affected should be identified.

6. Auditing of Works

This chapter is intended for chief engineers of guidance and auditing of forest management and for the persons in charge of auditing in the Enterprise Directorate. It contains explanations on auditing of biodiversity study and outputs carried out by the team of experts of Enterprise Directorate and to check whether the data is prepared in the suitable format for integration.

In addition, chief engineers of guidance and auditing of forest management will audit whether the outputs of the biodiversity study are included in the management plan as described in the previous chapter of the guide.

6.1. Auditing of Biodiversity Study and its Outputs by the Enterprise Directorate

The Enterprise Directorate audits the works and outputs carried out during the biodiversity assessment study. In addition, it participates in meetings that are part of some of the work of the team of experts and provides input. The works to be done during the biodiversity study, their plans and results reports are given in Table 16, observing the work order.

Table 16. Biodiversity assessment studies to be carried out by the integration project team

Work to be carried out by integration project team	Work output	Work to be carried out by Enterprise Directorate
Establishment of a team of experts	**Giving species group experts, GIS-Modelling expert, Biodiversity Coordinator's name, title, affiliated organization, contact information**	**- Review (requesting change) and approval of the expert team list.**
Planning species with conservation priority inventories	**For each species group (such as large mammals, birds, plants), preparation of the form in ANNEX 2 should by the relevant species group expert and submitted to the Enterprise for approval.**	**- Review (requesting change) and approval of the plan reports.** **- Writing information letter to local authorities (such as gendarmerie) for field experts and giving copy to the integration project team.**
Planning the inventory of other elements of biodiversity	**Work:** Interviews with Chiefs and other officers, who are familiar with the area, and identification of candidate sites for the OEB that may be present in the Enterprise Directorate. **Output:** Preparation of inventory planning report (ANNEX 5) which gives the plan of the field works to be carried out in the candidate sites and submittal to the approval of the Enterprise.	**- Participation in the determination of candidate sites meeting.** **- Review (requesting change) and approval of plan reports.** **- Writing information letter to local authorities (such as gendarmerie) for field experts and giving copy to the integration project team.**
Conducting inventories for species with conservation priority	**Work:** Conducting inventories for species with conservation priority by the relevant species group experts in accordance with the inventory plans previously submitted for each species group and for the specified periods **Output:** Submission of the study results to the Enterprise in the inventory results report format (ANNEX 3) and giving inventory form filled in the field in the annex of these reports (ANNEX 1).	**- Review (requesting change) and approval of results report.**

Work to be carried out by integration project team	Work output	Work to be carried out by Enterprise Directorate
Inventory of other elements of biodiversity	**Work:** Carrying out candidate areas by the relevant expert in accordance with the inventory plan previously submitted and within the specified time. **Output:** Submittal of the study results to the Enterprise in the inventory results report format (ANNEX 6) and adding the candidate field forms (ANNEX 4) filled in this report's annex.	- Review (requesting change) and approval of results report.
Identifying conservation priority areas (strict conservation zones and limited implementation zones)	**Work:** Modelling the species with conservation priority and distribution areas of the OEB by the GIS-Modelling expert according to the data collected in the field studies and the reports prepared by the experts and identifying the conservation priority areas. **Output:** Maps showing conservation priority areas (core and transition zones), tables that provide species with conservation priority and OEB on the basis of sub-compartment; result report containing relevant explanations. The annex contains the digital versions of all tables and maps (e.g. on the CD).	- Review (requesting change) and approval of results report.
Assessment of conservation priority areas with the Enterprise Directorate	**Work:** Conducting a meeting where the conservation priority areas and the constraints and implementation to be taken into consideration are finalized with the participation of the managers and Chiefs of the Enterprise Directorate, the officials from the District Directorate, the Forest Management Committee and the Integration Project Team. **Output:** A map showing the final borders of conservation priority areas and outputs to be included in the Forest Management Plan.	- Participation in the meeting and assessment. - Contribution to finalizing the outputs.
Preparation of implementation prescriptions for limited implementation zones	**Work:** Identifying the periods and constraints for forestry activities in the areas according to the habitat requirements of species with conservation priority within limited implementation zones. **Output**: Integrating implementation prescriptions for compartments and sub-compartments within limited implementation zones into the relevant tables in the forest management plan.	- Review (requesting change) and approval of implementation prescription table.
Submission of the results report of biodiversity assessment	**Work:** Writing the results report of the study and submitting all data and outputs (maps, data, etc.) digitally in the annex of the report. **Output**: Results report of biodiversity assessment, annexes, and their digital forms, including all information, explanations and other outputs to be used to integrate biodiversity into the forest management plans of the Enterprise Directorate.	- Review (requesting change) and approval of results report.

The team of experts shares the plan report and other documents prepared after the preparatory works with the Enterprise Directorate; and after obtaining the approval of the Enterprise Directorate, it carries out its works and prepares the results reports in accordance with the plan prepared. The Enterprise Directorate reviews the plan reports and preparatory documents drafted by the team of experts and informs the team of experts together with the justification of any additional information and changes recommendations, if any. The team of experts completes the plan report and preparatory works by making additions and changes notified by the Enterprise Directorate.

In the following chapters, the explanations regarding the works to be carried out by the team of experts and the audits to be carried out by the Enterprise Directorate on their supervision are given.

6.1.1. Creating the Team of Experts

The first stage of the study is the creation of a team of experts to conduct the biodiversity assessment study and its approval by the Enterprise Directorate. Experts to be involved in this team are as follows:

- "Species group experts" who will make species with conservation priority inventories,
- "GIS Modelling expert(s)" to carry out GIS analyses, species spread modelling, and identification of conservation priority areas,
- "Coordinator of the biodiversity work" to coordinate the whole biodiversity work and to prepare the inventory of other elements of biodiversity,

Persons in the team should be experts with the qualifications specified in the technical specifications. The integration project team, which constitutes the team of experts, submits the information (name, institution, contact information, etc.) of the experts involved in the team and their CVs to the Enterprise Directorate in the form of an "expert team list and information document". The Enterprise Directorate checks whether the integration project team is consisting of sufficient number and quality of persons to perform the biodiversity work. It informs the team of experts related to the changes it deems necessary. The team of experts creates the integration project team in line with the response of the Enterprise and finalizes the "expert team list and information document" and submits it to the Enterprise Directorate.

6.1.2. Planning the Inventory of Species with Conservation Priority

Information on technical recommendations for the inventory of species with conservation priority is given in the species with conservation priority pages in the Practitioner's Guide. For this, the team of experts drafts species with conservation priority inventory plan reports in accordance with the work tracking form, this guide, and the information and guidance provided in the Practitioner's Guide (see ANNEX 2). It must submit these reports to the Enterprise Directorate at least two weeks before the start of the inventory study of the relevant species with conservation priority. The Enterprise Directorate reviews the reports and informs the team of experts related to any changes within one week. The team of experts makes the necessary changes and finalizes the inventory plan reports and submits them to the Enterprise Directorate.

Based on these reports, the Enterprise Directorate audits whether species with conservation priority inventories are made by the specified species group experts on the specified dates and in the specified regions while conducting the auditing of species with conservation priority inventory studies.

6.1.3. Planning the Inventory of Other Elements of Biodiversity

Within the scope of this study, the team of experts submits the other elements of the biodiversity that can be found in the Enterprise Directorate, the forms, and map prepared for candidate areas (ANNEX 4) to the Enterprise Directorate. Then, the biodiversity coordinator and experts from the Enterprise Directorate (Chiefs, Forest Conservation Officers, etc.) hold a meeting to finalize the candidate sites.

Boxwoods are small trees that rarely form community or stand. A boxwood community showing a growth structure


© Uğur Zeydanlı

6.1.4. Inventory of Species with Conservation Priority

The species group expert or biodiversity coordinator, who will prepare the inventory of the relevant species with conservation priority, inform the Enterprise Directorate for their visit before starting the field work and visits the Enterprise Directorate before the field work and receives the necessary work permit documents from the Enterprise Directorate.

The Enterprise Directorate may appoint a Forest Conservation Officer during the study to supervise the works of the species group expert and assist the species group expert in the field. After completing the field study, the species group expert visits the Enterprise Directorate again before leaving the field and informs that he/she has completed the study.

After completing the species with conservation priority inventory studies, the team of experts submits the inventory results reports (see ANNEX 3) to the Enterprise Directorate. Attached to these reports are the inventory forms filled in the field (ANNEX 1). Reports are reviewed and approved by the Enterprise Directorate.

6.1.5. Inventory of Other Elements of Biodiversity

The team of experts prepares the inventory report of other elements of biodiversity and sends it to the Management Directorate (see ANNEX 5) following the map of candidate sites finalized with the Forest Enterprise Directorate. The Enterprise Directorate reviews the report and submits any recommendations of changes to the team of experts. The team of experts prepares the final version of the plan report and submits it to the Enterprise Directorate.

Auditing of the inventory of other elements of biodiversity and other relevant issues are the same as species with conservation priority inventory study. However, when conducting field works, a Forest Conservation Officer who is familiar with the area must be appointed to accompany the biodiversity coordinator. This contribution to be made by the Enterprise Directorate is important for finding the visited candidate sites and the determining their limits.

After the work is completed, the team of experts submits the inventory results report to the Enterprise Directorate. The report is reviewed and approved by the Enterprise Directorate (see ANNEX 6).

6.1.6. Identification of Conservation Priority Areas (Strict conservation and limited implementation zones)

After the completion of the inventory studies, the team of experts analyses the collected data as specified in the relevant chapters of this guide and prepares the species with conservation priority spreading modelling and conservation priority areas identification report and shares it with the Enterprise Directorate. The Enterprise Directorate examines the report and submits any recommendation of changes to the team of experts. The team of experts submits the report to the Enterprise Directorate after finalizing it. The report is reviewed and approved by the Enterprise Directorate.

6.1.7. Assessment of Conservation Priority Areas with the Forest Enterprise Directorate

The team of experts and the Enterprise Directorate carry out a two-day workshop to finalize the map of conservation priority areas and the table of conservation priority biodiversity elements, which are the leading outputs of the biodiversity study to be used by the forest management committee during the preparation of the management plan of the Enterprise Directorate The explanations for this study are given in the fourth chapter of the guide.

Before this workshop, the officials of the Enterprise Directorate should identify the areas to be allocated to the economic and social function that the Enterprise Directorate prescribes to be included in the management plan to be renewed, and the areas where there are social pressures or certain structures and mine exploration activities (road, HEPP, etc.) that are determined to be made and should bring the information related to them to the meeting. In the meeting, the conservation priority areas and the conditions for the mentioned areas are evaluated together and necessary changes are made on the map of conservation priority areas. These changes will include the removal of some of the conservation priority areas, the addition of new areas to the conservation priority areas, the removal of certain areas from strict conservation zones and transfer to limited implementation zones, and vice versa. When making these changes, it is important to ensure that the spatial objectives set for biodiversity elements in conservation priority areas are met and that the overall structure of conservation priority areas (for example, strict conservation zones in the middle and surrounding limited implementation zones) is not impaired. The conservation priority areas map changed and the constraints on biodiversity elements in these areas are reviewed and evaluated and the study is finalized.

A signature page stating that the outputs and decisions in the results report are done by the committee that will make the management plan as is it is prepared and attached to the end of the results report.

6.1.8. Writing Prescriptions for Limited Implementation Zones

After the clarifying the limited implementation zones at the end of the meetings and subsequent studies, prescriptions are written for the sub-compartments entering these areas on the scale of Sub-District Directorate. These prescriptions indicate which species and other elements of biodiversity are present in each sub-compartment. The habitat requirements and conservation recommendations of these elements are included in the prescriptions. Limited months when forestry practices should not be done are also given in these prescriptions. Upon completion of the prescriptions, these prescriptions are tabulated and each prescription is assigned a number. This prescription table will then be added by the planners at the beginning/end of the related plan tables (Table No: 22, 22A, 23, and 28, etc.). In addition, the prescription numbers will be written in the same tables in the descriptions of the compartments/ sub-compartments to which they coincide. In this way, Forest Enterprise Chiefs, who will use the plan, will be able to reach which prescription will be used in which sub-compartment directly through the plan tables.

The integration project team will carry out the work of preparing the prescriptions and assigning them to the sub-compartments and will share them with the planners who have prepared the plan of the relevant Sub-District Directorate. The check and approval of this working phase will be done by the planners.

6.1.9. Submission of the Final Report of Biodiversity Assessment

The team of experts submits the final report of biodiversity assessment with the annexes (including the GIS layers and the CD with other quantitative information) based on the final conservation priority areas map to the Enterprise Directorate. The Enterprise Directorate reviews the final report and submits any changes to the team of experts. The team of experts finalizes the final report and submits it in two hardcover copies to the Enterprise Directorate.

An example of the content of the final report is given in Table 17 below on what sections and annexes should be included in the final report of biodiversity assessment.

Table 17. Content of Şavşat Forest Enterprise Directorate Final Report of Biodiversity Assessment.

1. INTRODUCTION

1.1. PURPOSE AND SCOPE OF THE STUDY

1.2. STUDY TEAM

1.3. STUDY PROCESS

1.4. BIOGEOGRAPHICAL CHARACTERISTICS OF THE STUDY AREA

2. STATUS AND FINDINGS OF SPECIES WITH CONSERVATION PRIORITY AND OTHER ELEMENTS OF BIODIVERSITY

2.1. SPECIES

2.1.1 Large Mammals

2.1.2 Small Mammals

2.1.3 …

2.2. OTHER ELEMENTS OF BIODIVERSITY

2.2.1 Old Growth Forests

2.2.2 Stands with High Tree Species

2.2.3 …

3. MODELLING OF DISTRIBUTION OF SPECIES WITH CONSERVATION PRIORITY AND PRODUCTION OF MAPS

3.1. SPECIES

3.1.1 Brown bear (*Ursus arcto*s)

3.1.2 European roe deer(*Capreolus capreolus*)

3.1.3 …

4. IDENTIFYING CONSERVATION PRIORITY AREAS

4.1 EXPLANATION OF APPROACH OF IDENTIFYING CONSERVATION PRIORITY AREAS

4.2 WORKS AND OUTPUT OF IDENTIFYING CONSERVATION PRIORITY AREAS

4.3 ASSESSMENT OF IDENTIFYING CONSERVATION PRIORITY AREAS

5. PRACTICES AND CONSTRAINTS FOR CONSERVATION PRIORITY AREAS

5.1 ARRANGEMENTS FOR STRICT CONSERVATION ZONES

5.2 ARRANGEMENTS FOR LIMITED IMPLEMENTATION ZONES

6. EXPLANATION AND SIGNATURE PAGE

7. ANNEXES

ANNEX 1. INVENTORY FINAL REPORTS OF CONSERVATION PRIORITY BIODIVERSITY ELEMENTS

ANNEX 2. REPORT ON MODELLING OF DISTRIBUTION OF SPECIES WITH CONSERVATION PRIORITY

ANNEX 3. REPORT ON IDENTIFYING SPECIES WITH CONSERVATION PRIORITY

ANNEX 4. DATA RECORDS OF INVENTORY WORKS

ANNEX 5. FIELD INVENTORY FORMS

ANNEX 6. INTRODUCTORY PAGES ON SPECIES WITH CONSERVATION PRIORITY

ANNEX 7. INTRODUCTORY PAGES ON OTHER ELEMENTS OF BIODIVERSITY

ANNEX 8. TABLES SHOWING STRICT CONSERVATION ZONES AND LIMITED IMPLEMENTATION ZONES AND CONSERVATION PRIORITY BIODIVERSITY ELEMENTS THEY CONTAIN

In the annex of the final report, the documents that should be given digitally (in CD format) should include:

- Maps of sub-compartments or conservation priority areas on natural/artificial borders in format of *.shp (the database tables of these maps should contain information on the conservation priority biodiversity elements found in the relevant areas).
- Digital versions of the tables attached to the final report and the final report (for example in the form of Word and Excel files)

6.2. Auditing the Integration of Biodiversity Assessment into Management Plans

The management guidance and audit chief engineers audit whether the necessary arrangements for conservation priority areas and the information in the related plan section and tables are made as described in the fifth chapter of this guide. Subjects to be considered in the supervision have been prepared by taking into consideration the Communiqué No. 301 published by Directorate General of Forestry, Forest Administration and Planning Department:

- After the determination of the biodiversity integration study, to check whether the conservation priority areas map approved by the Forestry Enterprise Directorate has been settled on the marked lines and that it has been processed in accordance with the technique of the management map without making any changes except minor corrections,
- Plans being prepared in accordance with the forest form, management period or aimed scale, and the aimed organization determined for conservation priority areas in accordance with the requirements of the habitat and the constraints imposed by the conservation priority biodiversity elements,
- Inclusion of implementation prescriptions prepared for limited implementation zones in management plans, showing which prescription is associated with which sub-compartment/compartment in tables related to forestry activities (silvicultural practices, afforestation activities, etc.) (Table No: 22, 22A, 23, and 28 etc.)

7. Monitoring of the Practices


© Uğur Zeydanlı

7.1. Monitoring

Today, monitoring is considered as one of the most important management tools in every sector. We will not be able to notice changes and track them without monitoring the same. Monitoring the impacts of forestry practices on forest ecosystems is crucial for better forest management.

7.1.1. Defining the Goal of Monitoring

Each monitoring should have a goal determined according to management objectives. Otherwise, it will not be possible to produce useful outputs as a result of monitoring. Although it seems to be a very simple matter, this problem can be encountered even in very large and comprehensive monitoring studies. Therefore, designing a monitoring that will reveal the contribution or change related to the management objectives is the main feature of a good monitoring program. Otherwise, the answers we get as a result of the monitoring work will not work and we will be monitoring in vain both financially and temporally. In order to integrate biodiversity into forestry practices, the goal of monitoring should be determined according to resource values, pressures on field, and implementations for these areas.

Biodiversity, which is the subject of monitoring, is described in 3 separate characteristics (see Chapter 1). They are:

a. Compositional: Living organisms

b. Structural: Natural or semi-natural environment in which organisms live

c. Functional: Ecological processes supported by organisms and environments

Therefore, in order to fully understand and monitor the status of biodiversity, it is necessary to monitor all three characteristics. When it is desired to carry out these monitoring activities on the scale of Forestry Sub-District Directorate, a table emerges as follows:

Table 18. Compositional, structural and functional monitoring in forest management scale.

Characteristic	Possible Monitoring Targets	Monitoring Method
Compositional	Composition and distribution of species living in forest; species richness, endemism rates; the presence or absence of important species; the course of populations of important species; changes of these species over time.	Tracking by species (important species to be identified).
Structural	Forest crown closure; openings in the forest; covers of vertical layers in forest (herbaceous layer, shrub layer, small tree and tall tree layer); the number of old trees; number of overturned or planted dry wood; the number of fruit trees for the feeding of wildlife; organic soil and dead cover thickness.	Monitoring methods of physical or chemical properties of ecosystem (N, P measurements, Carbon flow, amount of increase), determination of indicator types and monitoring of them, comparison of forest inventories of different times.
Functional	Whether to host sensitive or rare animals or plants; whether the nutritional cycle is healthy; soil fertility level; water protection.	Variation of the number of species in the field over time, monitoring the determined levels of the nutrient cycle, monitoring the amount of biomass.

7.1.2. Deciding on What to Monitor

There are numerous criteria that can be followed about forest biodiversity. Monitoring programs to be created for ecosystem management are generally those that have to be applied with limited resources. Therefore, we have to choose carefully what to monitor. The first step for this is to identify the questions we are looking for answers.

The elements such as the current establishment of the forest, tree wealth, increase and non-wood forest products is regularly monitored in a healthy way with the forest inventory of the Directorate General of Forestry. This monitoring information provides the necessary information on how much production will be made in which forest function.

In the same way, it is possible for us to adapt or modify our intervention methods based on the data we obtain during the next planning period by learning whether the conservation-aimed functions really protect the values aimed to be conserved.

For example, if the management plan has any working objective among the general forest functions of nature conservation as the working objective, it is necessary to monitor the important biodiversity elements used to determine the objective of the working. It may be possible to determine the contribution or harm of these practices to the conservation of biodiversity by monitoring the change in biodiversity elements as a result of the intervention type and amount given for that business purpose.

7.1.3. Golden Rules of Monitoring

After the questions are answered, there are several important rules to choose the monitoring method that will answer those questions.

- Purposeful Monitoring: The information provided by the monitoring result should enable us to review our decisions regarding our management objectives.
- Early-warning feature: Is the monitored item or indicator selected sensitive enough to give us early enough information if there is a change in the ecosystem?
- Common indicators: Does the monitored element or the indicator selected show spread across the entire ecosystem about which we want to receive information?
- A practical and inexpensive system: More people and financial resources should not be required to monitor the selected element. The data obtained as a result of monitoring this element should be easy to evaluate.
- Accurate reflection of the ecosystem: The difference between the changes that the selected element exhibits in its natural cycle and the changes caused by the environment must be easily distinguishable.
- Continuity: The monitoring management of the element monitored must remain the same over the years, so that the results are comparable. If any method change has to be made, it must be recorded in order for the those making assessment to make it correctly.
- Pilot study: Before deciding on a monitoring method, it is important to conduct at least one seasonal "pilot monitoring". In this study, the monitoring method is tested and monitoring is started after the method is clearly settled.

7.1.4. Collection of Monitoring Data and Analysis

The measurements taken during the monitoring should always be carried out at the same time and in the same way. Only this way, the results obtained can be compared with each other. It is important to record the monitoring method with a "Monitoring Protocol", considering that those carrying out monitoring may change over time. The monitoring protocol should contain the following information:

- Question for which answer is sought: This question will form the basis of the monitoring program. We can call this the first step of monitoring. Explaining why we need an answer to this question will enable people to evaluate the data in the future to do it more accurately, or it will be the most important guide when a change in the program is required.
- Brief characteristics of the element to be monitored: If we follow an herbaceous plant, we need to know when it blooms and when its seeds ripen so that we can choose the right time to monitor these characteristics. If we are watching insects, we can determine their populations correctly if we know when they hatch and when they fly. If flight times change due to global warming, we can easily identify it, and if necessary, we can try to adapt the program to these changes in the process.
- Which methods to be used in monitoring: Where, at what intensity sampling, how much time will be spent for each sampling are very important. For example, if we record bird sounds for only 15 minutes when we go at

first and spend 60 minutes on the other, it will not be right to compare these results with each other. Likewise, if the sampling area to be used for counting plants is 1 m^2, it must be the same size each time. The monitoring method must be clearly recorded to avoid such problems.

- How frequent to monitor: For example, water quality monitoring will be carried out several times a year. But deer populations can be monitored once a year. Some plant species can be monitored every few years.
- How much of a part to be monitored: When a monitoring is performed, the entire population of a species does not need to be monitored. However, we need to determine how much of the population we need to monitor. When water quality monitoring is carried out, it is important to determine how many places should be sampled at a time.
- Where to monitor: It is very important where to be monitored. Especially if fixed sampling areas are to be used, sampling should be carried out at the same point at each sampling time.
- How long to monitor: How long do we need to monitor? If our monitoring system was established to fulfil the early warning task for species or ecosystems, then monitoring should continue as long as those species and ecosystems are there. However, if monitoring is performed to seek answers to a particular question, then the duration of the monitoring should continue until we reach the desired conclusion. However, it is generally a more accurate approach to establish indefinite monitoring programs in terms of area management. If necessary, the content of the monitoring program may change with changing questions.
- Where and how data to be stored, and shared with whom: Although it may seem very simple, it is one of the most critical stages of monitoring. If it is not determined where and how the data will be stored as a result of monitoring, the collected data will not work, and will even be lost with the changing implementers over time. Here you need to pay attention to four points:

    1. Data logging form: Data logging form is important in terms of minimizing the log differences that will arise from the collection of data by different people.
    2. The data collected should be transferred to the database in a disciplined and meticulous form.
    3. The database should be designed to cover the collected data.
    4. The database should be designed by considering what kind of report will be needed at the end of the query. If the data cannot be entered to answer the desired question, the whole study will be wasted or an intensive effort will be required again.

- How, by whom and how often the data should be analyzed: The main goal of the monitoring study is not to collect data. The main goal of the monitoring study is to find answers to some questions or monitor changes in the system to better manage the area. Therefore, data should be analyzed periodically and answers to our questions should be sought. One of the most critical points here is that if the data is analyzed prematurely, it will lead to incorrect results. There are a number of continuous fluctuations in natural systems, but due to any effect other than these fluctuations, long-term data are needed to understand the overall changes in the system. If we analyze the data prematurely, we can get misleading results and make mistakes. In the same way, if we analyze too late, we will not be able to understand the early warning feature of the system. What we need here are experts who know the characteristics of the element we follow and the ecosystem studied.

7.1.5. Stages of Monitoring

The goal of the monitoring activities and the implementation of the activities to be conducted step by step is very important. For this purpose, the diagram in Figure 15 can be utilized.

Table 19. Stages of monitoring.

Why will we monitor?	1. Determination of work area and ecological scope
	2. Establishing the general framework of the monitoring program according to resource values and management objectives/practices.
	3. Determining the threats to the area.
	4. Identifying the basic processes that fall within the scope of these threats.
	5. Identifying indicators and target species that can be used to measure changes in the area.
	6. Determining the indicators that measure the level of human impact in the area.
	7. Describing the sampling and data collection process according to the means available.
What will we do now?	8. Assessments of results.
	9. Translating results into implementation decisions.
	10. Revision of monitoring program (purpose and sampling method) according to changing conditions.
	11. Continuing monitoring.

Three years after the integration work at the Yusufeli Forest Enterprise Directorate, monitoring was carried out. The monitoring steps followed in this study are as follows:

Phase 1: The technical report and forest management plans prepared by the monitoring expert within the scope of the integration study of the Yusufeli Forest Enterprise Directorate were first examined and ecological aspects of the study area were studied.

Phase 2: The application tables and functional planning criteria included in the forest management plans of the Yusufeli Forest Enterprise Directorate were utilized in the preparation of the monitoring program.

Phases 3 & 4: During the interviews conducted with the officials of the Enterprise Directorate and the local people, threats were tried to be identified. In this context, it has been revealed that the most threat is poaching.

Phases 5 & 6: Brown bear was selected as the species to be monitored in order to reveal the ecological changes in the study area and the level of human impact. As a carnivorous and herbivorous creature, the brown bear has a very wide habitat and is fed from different forest species in different seasons. Therefore, by selecting the brown bear as the species to be monitored, it was possible to monitor the changes in the forest structure and connectivity in a healthy way.

Phase 7: At this stage the monitoring expert continued to work with the large mammalian expert. A camera trap was installed to monitor the bears at 2 points selected from the determined bear distribution areas. In selecting these points, particular attention was paid to the fact that it is one of the limited implementation zones and that forestry activities were carried out in line with the prescriptions proposed within 3 years.

Phase 8: Images of the camera traps collected 3 months after installation were examined and evaluated by a large mammal expert. No change was observed in the number of brown bears.

Phases 9 & 10: As a result of the monitoring study, it was decided to continue to apply the existing management plans (especially prescriptions recommended for limited implementation zones).

Phase 11: Yusufeli Forest Enterprise Directorate should conduct a monitoring for brown bear once every three years. The results of the monitoring study should be evaluated in comparison with the results of the integration study and the previous monitoring.

7.2. Monitoring the Practices in Management Plan

One of the objectives of the monitoring studies is to determine the extent to which conservation constraints and specific practices in forest management plans, where biodiversity is integrated, can be implemented. Monitoring of practices that should be made or avoided in areas with high conservation value and under nature conservation function in management plans can be monitored under the following clauses:

- Can the practices and constraints of the plan be easily found in the necessary parts of the plan (tables, text, maps, etc.) by the Forest Sub-District Chiefs who are implementing the plan?
- Can the prescriptions for the different practices and constraints given be understood by the Chiefs?
- What are the challenges in implementing these different practices and constraints, and what are the solutions that those implementing the them follow to overcome them?
- What additional/practical solutions can be found to facilitate the implementation of these different practices and constraints in integrated plans?

The performance of the proposed method and tools related to the integration study will be evaluated with this monitoring. As a result of this assessment, decisions regarding the improvement of methods and tools can be taken, as well as decisions on increasing the capacity and equipment of planners or practitioners. This monitoring program is a performance monitoring program focused on the functioning of the system rather than the result of the studies.

Another objective of monitoring is to determine to what extent an integrated plan, as required, has been successful in the long-term in the conservation and development of biodiversity in the relevant enterprise forest. In order to do that, experts who conduct the biodiversity studies should make field studies with Forest Enterprise Chiefs in order to ensure simple but regular monitoring of species with conservation priority and ecological processes which are the focus of the integrated plan. Here, it is tried to monitor the results of the performance shown (after the implementation of the proposed integration).

In addition to existing practices, limited production from limited areas of conservation priority areas may be part of the current auditing of plan implementation. However, the practices in the areas remaining in the strict conservation areas that will not be subject to production will need to be inspected separately. When extraordinary revenue application is required in strict conservation areas (see Section 5.1.1), it should be considered as part of the current plan implementation auditing within wood production.

Within this context, the Forest Enterprise Directorate should enter the practices made in the conservation priority areas (sub-compartments) under the strict conservation zone and limited implementation zones in the tables numbered 35 which it issues and send to the center annually. During entering the implementation of the conservation priority sub-compartments in Tables 35 (Annual Report on the Implementation of Forest Management Plans), the following issues need to be paid attention to:

- The starting and ending dates of the implementation in these sub-compartments (starting and ending days of field works) should be written in the relevant column in the table numbered 35 in order to check whether the practices made in the relevant sub-compartments are performed outside the critical time periods (such as breeding, nesting) of the species with conservation priority contained there.
- The explanations that indicate that the practices made in the relevant sub-compartment are made in a way that protects the critical habitat needs of the species with conservation priority contained there should be written in the explanations section of Table 35.
- In addition to the practices carried out in the relevant sub-compartment, explanations regarding the situations such as poaching, collection overturned and dried trees, and the collection of plant species should be written in the explanation section.

Information about the subject should be given to the Directorate and the approval must be obtained before the implementations and developing situations (such as natural disasters, construction activities).

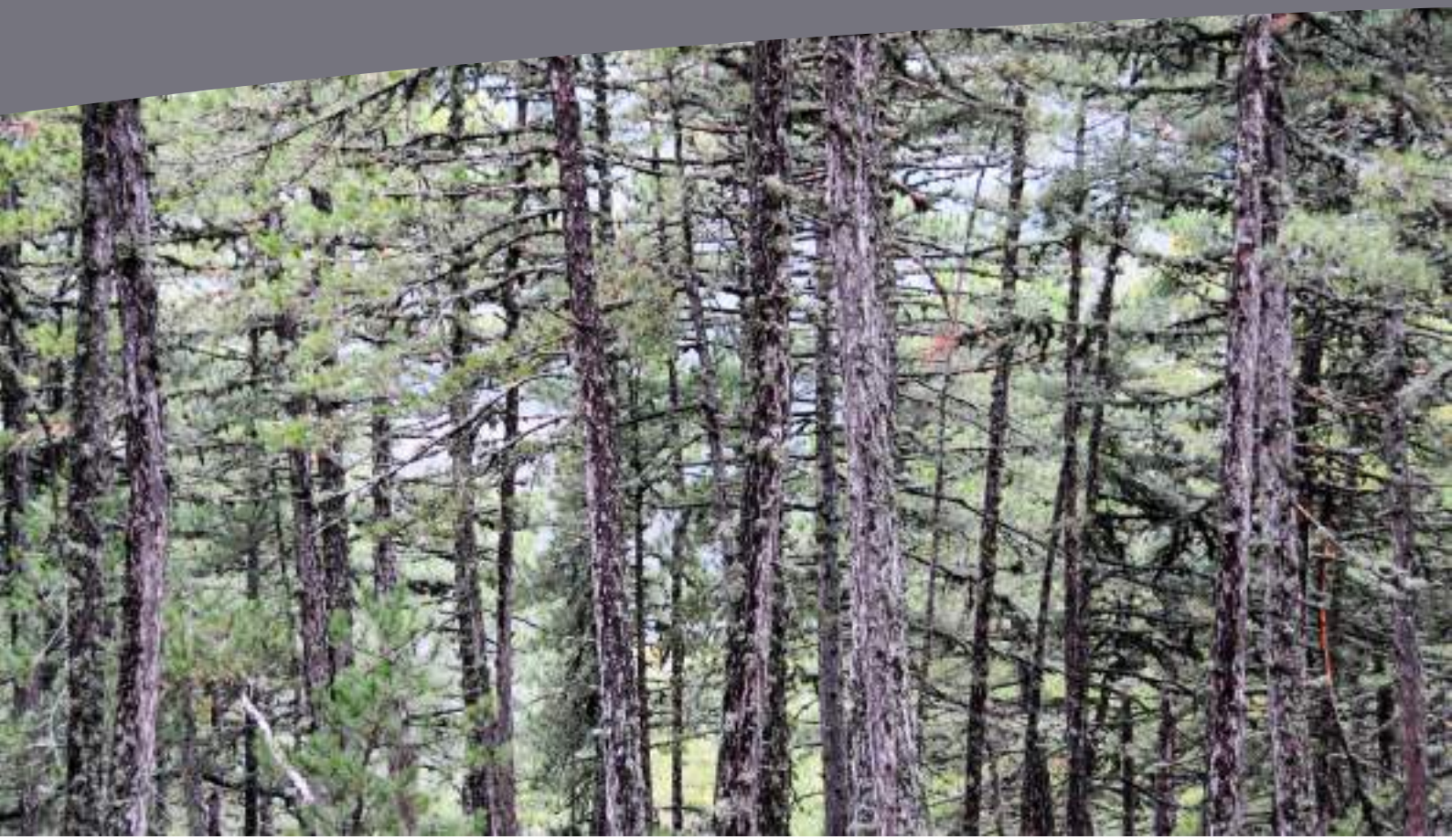
In addition, the integration of biodiversity into the management plans can be monitored by adding the following items to the "Forest Management Plan Implementation Audit Guide" used in the implementation of ecosystem-based functional forest management plans:

- Have any forestry activities been carried out in the sub-compartments in the first implementation zone (strict conservation zone) determined within the scope of "the integration of biological diversity into forest management plans"?
- Have the interventions and restrictions for biodiversity conservation been implemented in the forestry activities carried out in the sub-compartments which are included in the second implementation zone (limited implementation zone) determined within the integration of biological diversity into forest management plans and subject to the process tables such as tables 23, 22, 22A and 28? Have the recommendations developed for ecosystem services been implemented in the context of the "integration of biological diversity into forest management plans?"

7.2.1. Lessons Learned from Monitoring Experiences

A few years after start of implementation of an integrated plan in some Forest Sub-District Directorates, where a project of integration of biological diversity into management plans has been implemented, monitoring activities have been carried out with Forest Enterprise Chiefs. The situations encountered are summarized below:

- It has been seen that in the sub-compartments and compartments that are in the nature conservation general forest function, sometimes cutting is made within the scope of extraordinary revenue works. In these works, it has been suggested that at least some qualities should be considered in the selection of trees to be cut. For example, very old, old and hollow trees and huge trees are not preferred and left in the field.
- It has been seen that it is important to the prepare of plans such as afforestation and road plans and to ensure the coordination of District Directorate and Sub-District Directorates in the studies related to permission and servitude, and to prepare these works in line with the plan constraints in the limited implementation and strict conservation zones.
- In some plans, it has been seen that sub-compartments for production and sub-compartments for nature conservation are located in the same compartment. In this type of implementation, it is suggested that more moderate forestry practices should be carried out in the sub-compartments reserved for nature conservation.
- It has been observed that implementation prescriptions prepared for limited implementation zones are added to some plans as a separate file. This leads the Chiefs to fail to follow the proposed constraints on forestry activities to be implemented in the relevant sub-compartments. For this reason, the implementation prescriptions must be included in the table 23 of the plan in the sections of each sub-compartment and compartment.
- In addition to knowing and understanding the constraints and prescriptions to be applied for the areas within the first implementation zone (strict conservation zone) and the second implementation zone (limited implementation zone), it is also important that other departments, such as the Silviculture, Forest Enterprise and Planning and Non-Wood Products and Services Departments in Forest District Directorate, know about it and that related work takes into account them.
- In order to ensure that the time limits specified in the prescriptions for limited implementation zones are complied with in the works to be made through tenders (planted sales etc.), this information should be included in the specifications of the related tenders (field delivery and work completion may be limited to this period). In order to ensure compliance with the time limit, Chiefs should conduct the necessary information and checks more stringently.
- In the tables numbered 22, which have low-closure (distorted) and open areas, especially the sub-compartments/compartments with endemic herbaceous species are not included in the plan or plan maps. Afforestation or erosion control works in these areas may adversely affect plant species. Therefore, in the section of the tables numbered 22 of the plans, a breakdown of the distorted and open areas reserved for nature conservation (limited implementation or strict conservation) should be given.



© Uğur Zeydanlı

8. References

Arslan A, Zima J (2014). Karyotypes of the mammals of Turkey and neighbouring regions: a review. Folia Zool. – 63 (1): 1–62.

Balmford, A., Mace, G.M., Ginsberg, J.R. 1998. The challenges to conservation in a changing world: putting processes on the map, in Conservation in a Changing World, Mace, G.M, Balmford, A., Ginsberg, J.R. (eds) Cambridge University Press, Cambridge.

Başkent, E.Z., Köse, S., Kaya, Z., Altun, L., Terzioğlu, S., Başkaya, Ş., Eser, T. 2004. Türkiye Cumhuriyeti, GEF II: Biyolojik çeşitlilik ve doğal kaynak yönetimi projesi: Türkiye'de biyolojik çeşitliliğin orman amenajman planlarına entegrasyonu strateji ve tasarımının geliştirilmesi sonuç raporu, 57s.

Başkent, E.Z., Köse, S., Terzioğlu, S., Başkaya, Ş., Altun, L., 2005. Biyolojik çeşitliliğin orman amenajman planları ile bütünleştirilmesi GEF Projesi yansımaları-1. Orman Mühendisliği Dergisi Sayı 4-6:31-37.

Başkent, E. Z., Başkaya, Ş., Terzioğlu S., 2008. Developing and implementing participatory and ecosystem based multiple use forest management planning approach (ETÇAP): Yalnızçam case study, Forest Ecology and Management, 256:798–807.

Bergeron, Y., Harvey, B. 1997. Basing silviculture on natural ecosystem dynamics: an approachapplied to the southern boreal mixedwood forest of Quebec. Forest Ecology and Management, 92:235-242.

Birleşmiş Milletler 1992. Biyolojik Çeşitlilik Sözleşmesi. Rio de Janeiro.

Carroll, C., Noss, R.F., Pacquet, P.C. 2001. Carnivores as focal species for conservation planning In the Rocky Mountain region. Ecological Applications, 11:961-980.

Caughley, G., Gunn, A. 1996. Conservation Biology in Theory and Practice. Blackwell Science, Cambridge, Massachusetts.

Cowling, R.M., Pressey, R.L., Lombard, A.T., Desmet, P.G., Ellis, A.G., 1999. From representation to persistence: requirements for a sustainable system of conservation areas in the species-rich mediterranean- climate desert of southern Africa. Diversity and Distributions, 5:51–71.

Cowling, R.M., Pressey, R.L., Rougetc, M., Lombard, A.T. 2003. A conservation plan for a global biodiversity hotspot- the Cape Floristic Region, South Africa. Biological Conservation, 112: 191-216.

DeGraaf, R.M., Yamasaki, M.Y., Leak W.B., Lanier J.W. 1992. New England Wildlife: Management of Forest Habitats. USDA, Forest Service, General Technical Report NE-144.

Demir, M., Çağatay, A., Kırış, R. 2008. Türkiye'de orman amenajmanının geçirdiği evrelerin kısa tarihçesi, (içinde) Ülgen, H., Zeydanlı, U. (ed.) Orman ve Biyolojik Çeşitlilik, Doğa Koruma Merkezi, 1-14.

Desmet, P.G., Cowling, R.M., Ellis, A.G., Pressey, R.L., 2002. Integrating biosystematic data into conservation planning: perspectives from southern Africa's Succulent Karoo. Systematic Biology 51:317–330.

Doğa Koruma Merkezi, 2011. Yusufeli Orman İşletme Müdürlüğü Biyolojik Çeşitliliğin Orman Amenajman Planlarına Entegrasyonu Projesi Raporu. Doğa Koruma Merkezi, Ankara.

Doğa Koruma Merkezi, 2012. Şavşat Orman İşletme Müdürlüğü Biyolojik Çeşitliliğin Orman Amenajman Planlarına Entegrasyonu Projesi Raporu. Doğa Koruma Merkezi, Ankara.

Doğa Koruma Merkezi, 2014. Gümüşhane Orman İşletme Müdürlüğü Biyolojik Çeşitliliğin Orman Amenajman Planlarına Entegrasyonu Projesi Raporu. Doğa Koruma Merkezi, Ankara.

Furman A, Postawa T, Öztunç T, Çoraman E (2010) Cryptic diversity of the bentwing bat, *Miniopterus schreibersii* (Chiroptera: Vespertilionidae), in Asia Minor. BMC Evolutionary Biology, 10 (1): 121.

Gardner, T. 2010. Monitoring Forest Biodiversity: Improving Conservation through Ecologically-Responsible Management. Routledge.

Groom, M.J., Meffe, G.K., Carroll C.R. 2005. Principles of Conservation Biology (3rd ed.). Sinauer Associates.

Hanski, I., Ovaskainen, O. 2000. The metapopulation capacity of a fragmented landscape. Nature, 404: 755-758.
Işık, K., Yaltirik, F., Akesen, A. 1997. Forests, biological diversity and the maintenance of the natural heritage. XI. World Forestry Congress, Antalya.Kaya, Z., Raynal, D.J. 2001. Biodiversity and conservation of Turkish forests. Biological Conservation, 97:131-141.

Karaçetin, E. Ve Welch, H. J.. 2011. Türkiye'deki Kelebeklerin Kırmızı Kitabı. Ankara: Doğa Koruma Merkezi. Erişim: [www.dkm.org.tr]

Kimmins, J.P. 2003. Forest Ecology (3rd ed.). Benjamin Cummings Publishers.

Köhl, M., Uuttera, J., Bachmann, P., Paivinen, R., 1998. Assessment and planning for forest biodiversity: A European initiative. in Dallmeier, F., Comiskey, J. A. (ed.) Forest Biodiversity Research, Monitoring And Modeling: Conceptual Background And Old World Case Studies, 357-365.

Kryštufek B and Vohralík V (2001) Mammals of Turkey and Cyprus Introduction, Insectivora. Koper. Science and Research Centre of the Republic of Slovenia.

Krystufek B and Vohralik V (2005) Mammals of Turkey and Cyprus (Rodentia I: Sciuridae, Dipodidae, Gliridae, Arvicolinae). Koper. Science and Research Centre of the Republic of Slovenia.

Kryštufek B, Vohralík V (2009). Mammals of Turkey and Cyprus (Rodentia II: Cricetinae, Muridae, Spalacidae, Calomyscidae, Capromyidae, Hystricidae, Castoridae). Koper, Slovenia.

Lambeck, R.J. 1997. Focal species: a multi-species umbrella for nature conservation. Conservation Biology, 11(4):849-856.

Lindenmayer DB., Franklin, JF. 2002. Conserving forest biodiversity: A comprehensive multiscaled approach. Island Press, London. ISBN: 1-55963-935-0.

Lindenmayer, D.B., Franklin, J.F. 2013. Conserving Forest Biodiversity: A Comprehensive Multiscaled Approach. Island Press.

Mills, L.S., Soule, M.E., Doak, D.F. 1993. The keystone-species concept in ecology and conservation. Bioscience 43(4): 219-224.

Moritz, C., 2002. Strategies to protect biological diversity and the evolutionary processes that sustain it. Systematic Biology 51: 238–254.

Orman Genel Müdürlüğü, 2014. Ekosistem Tabanlı Fonksiyonel Orman Amenajman Planlarının Düzenlenmesine Ait Usul ve Esaslar. 299 sayılı tebliğ.

Orman Genel Müdürlüğü, 2014. Silvikültürel Uygulamaların Teknik Esasları. 298 sayılı tebliğ.

Niemela, J., Larsson, S., Simberloff, D. 2002. Finding Ways to Integrate Timber Production and Biodiversity in Fennoscandian Forestry. Scandinavian Journal of Forest Research, 16(sup3): 119-123.

Noss, R.F. 1999. Assessing and monitoring forest biodiversity: a suggested framework and indicators. Forest Ecology and Management, 115:135-146.

Özçelik, R. 2006. Biyolojik çeşitliliği korumaya yönelik yapılan (planlama ve koruma) çalışmalar ve Türkiye ormancılığına yansımaları. SDÜ Orman Fakültesi Dergisi A-2:23-36.

Pressey, R.L. 2004. Conservation planning and biodiversity: assembling the best data for the job, Conservation Biology, 18: 1677-1681.

Shafer, C.L. 1990. Nature Reserves: Island Theory and Conservation Practice. Smithsonian Institution Press, Washington, DC.

Turak, A.S., Zeydanlı, U., Özüt, D., Yılmaz, D., Bilgin, C.C. 2010. Yusufeli-Altıparmak A Case Study for the integration of biodiversity into the forest management planning. in Yurdaer, M., Öztürk, S., ed (2010) Forest Management Planning in Turkey: Past to present and future. General Directorate of Forestry. Ankara.

Turak A., Zeydanlı, U., Özüt, D., Yılmaz, D., Bilgin C.C. 2010. Biyolojik çeşitliliğin orman amenajmanına entegrasyonunda Yusufeli-Altıparmak örneği ve sonrası. Orman Amenajmanının Dünü, Bugünü ve Geleceği Çalıştayı Sonuç Bildirgesi ve Tebliğler, Orman İdaresi ve Planlama Dairesi Başkanlığı, Ankara, 2010.

Ülgen, H., Zeydanlı, U. (ed.) 2008. Orman ve Biyolojik Çeşitlilik. Doğa Koruma Merkezi. Dönmez Ofset, Ankara.

Yiğit N, Çolak E, Sözen M (2016). A new species of voles, *Microtus elbeyli* sp. nov., from Turkey with taxonomic overview of social voles distributed in southeastern Anatolia. Turk J Zool. 40: 73-79.

Yiğit N, Çolak E, Sözen M, Karataş A (2006). Rodents of Türkiye. Ankara, Turkey: Meteksan Co.

Wilcove, D.S. 1989. Protecting biodiversity in multiple-use lands: Lessons from the US forest service. TREE 4 (12):385-388.

Zeydanlı, U., Tuğ, S. 2008. Biyolojik çeşitlilik ve orman ekosistemlerindeki önemi, (içinde) Ülgen, H., Zeydanlı, U. (ed.) Orman ve Biyolojik Çeşitlilik, Doğa Koruma Merkezi, 15-36.

9. Annexes

ANNEX 1. Species with Conservation Priority Inventory Forms

ANNEX 1.1. Sampling Field Form

Sampling Field Form

Integration of Biodiversity into Forest Management Plans

Enterprise Director

Filled by

Location Information

Region No | **Sampling Field No** | **Village**

GPS Coordinates Defining Sampling Area

If a transect is travelled along a line, the head and end coordinates are written.

If a field has been scanned, at least 3 or 4 coordinates indicating that field must be written.

Zone	East	North	Zone	East	North
Zone	East	North	Zone	East	North

Other Information

Date Day Month Year **Time** Starting Ending **Height** **Dominant View**

: :

Is species recorded? Yes ☐ No ☐ Species

Is there general field image? Yes ☐ No ☐ Image No

Weather Conditions Sunny ☐ Cloudy ☐ Rainy ☐ Windy ☐ Other

Habitat Information

General Habitat

- ☐ Forest
- ☐ By-Forest
- ☐ Stream-side Woodland/Scrub
- ☐ Opening in forest
- ☐ Steppe
- ☐ Meadow
- ☐ Reeds
- ☐ Lake
- ☐ Housing
- ☐ Agriculture
- ☐ Other

Please specify, if other

Habitat Observation Notes

Observations regarding suitability of habitat for the species, threats etc.

ANNEX 1. Species with Conservation Priority Inventory Forms

ANNEX 1.2. Species Recording Forms

ANNEX 1.2.1. Fauna Species Recording Form

Fauna Species Recording Form

Integration of Biodiversity into Forest Management Plans

Species | **Filled by**

Recording Information *Fill in one record for all observation / track recordings within a 15m radius*

Region No | **Sampling Field No** | **Village**

GPS Coordinates Defining Sampling Area Zone | East | North

Date Day | Month | Year **Time** : | **Image No**

Recording Type

Observation ☐
- ☐ Grown
- ☐ Larva
- ☐ Caterpillar

Track ☐
- ☐ Camera Trap
- ☐ Egg
- ☐ Sound
- ☐ Other

Number of Individual Recorded
Sum of those seen at that point and within 15m radius

Intensity
Intensity seen at that point and within 15m radius
- ☐ Low
- ☐ Medium
- ☐ High

Habitat Information

General habitat characteristics of the 15m radius around the point where the recording was taken

Bottom Layer (Ground)

Intensity (amount covered)

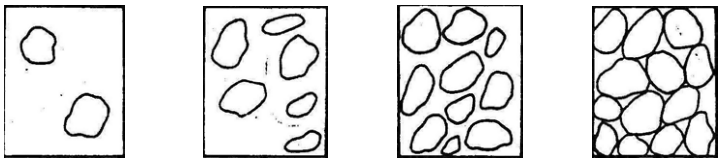
☐ Herbaceous	☐ Low	☐ Medium	☐ High
☐ Bush	☐ Low	☐ Medium	☐ High
☐ Stone/Rock	☐ Low	☐ Medium	☐ High
☐ Soil	☐ Low	☐ Medium	☐ High
☐ Other ☐	☐ Low	☐ Medium	☐ High

Upper Layer

Closure (closure of upper forest crown)

☐ Broad-Leaved Forest	☐ 0-10 %	☐ 10-40%	☐ 40-70 %	☐ 70+ %
☐ Coniferous Forest	☐ 0-10 %	☐ 10-40%	☐ 40-70 %	☐ 70+ %
☐ Mixed Forest	☐ 0-10 %	☐ 10-40%	☐ 40-70 %	☐ 70+ %
☐ Open				

(Use the figures on the sides to determine the degree of closure.)



Notes

ANNEX 1. Species with Conservation Priority Inventory Forms

ANNEX 1.2. Species Recording Forms

ANNEX 1.2.2. Flora Species Recording Form

Flora Species Recording Form

Integration of Biodiversity into Forest Management Plans

Species **Filled by**

Recording Information *Fill in one record for all observation / track recordings within a 15m radius*

Region No **Sampling Field No** **Village**

GPS Coordinates Defining Sampling Area Zone East North

Date Day Month Year **Time** : **Image No**

Species Intensity

(Use the following tables as references when specifying density.)

Herbaceous		
Area Size	**Number of Individuals in the Area**	**Intensity Remark**
16 m²	**Less than 16**	**Very rare**
16 m²	**16-32**	**Rare**
4 m²	**8-20**	**Medium**
4m²	**More than 20**	**Intense**

Arboreal		
Area Size	**Number of Individuals in the Area**	**Intensity Remark**
400 m²	**Less than 5**	**Very rare**
400 m²	**5-10**	**Rare**
400 m²	**10-15**	**Medium**
400 m²	**Less than 15**	**Intense**

Species Spread Area _____ m²

Intensity Remark Very rare ☐ Rare ☐ Medium ☐ Intense ☐

Habitat Information

General habitat characteristics of the 15m radius around the point where the recording was taken

Bottom Layer (Ground)

Intensity (amount covered)

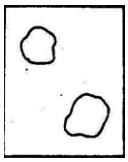
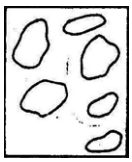
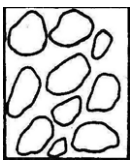
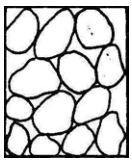
☐ Herbaceous	☐ Low	☐ Medium	☐ High
☐ Bush	☐ Low	☐ Medium	☐ High
☐ Stone/Rock	☐ Low	☐ Medium	☐ High
☐ Soil	☐ Low	☐ Medium	☐ High
☐ Other ☐	☐ Low	☐ Medium	☐ High

Upper Layer

Closure (closure of upper forest crown)

☐ Broad-Leaved Forest	☐ 0-10 %	☐ 10-40%	☐ 40-70 %	☐ 70+ %
☐ Coniferous Forest	☐ 0-10 %	☐ 10-40%	☐ 40-70 %	☐ 70+ %
☐ Mixed Forest	☐ 0-10 %	☐ 10-40%	☐ 40-70 %	☐ 70+ %
☐ Open				

(Use the figures on the sides to determine the degree of closure.)

Notes

ANNEX 2. Species Inventory Planning Report

Type Inventory Plan Report Format and Explanations

Inventory Species:
Latin and Turkish names of the species to be taken into inventory will be written.

Name of Expert:
Name and surname of the expert who will make the inventory will be written.

Name(s) of Person(s) to Accompany the Expert:
If there is any other researcher(s)/assistant (s) to accompany the expert, their name and surname will be written.

Inventory Work Start and End Dates:
The date range of the inventory study will be written as day / month / year.

Map showing the planned destinations for inventory:
A map showing the selected locations from the appropriate areas map prepared by the modelling expert for the species with conservation priority(s) will be provided with the region numbers.

Daily Field Plan:
Daily field plan will be entered in the table below.

Day	**Field Starting Time**	**Field Ending Time**	**Areas to be Visited** (A nearby settlement name and region number on the map)	**Work to be done**

Description of the sampling method to be used:
During the inventory, the method(s) to be used in recording from the species with conservation priority will be explained. The equipment etc. to be used will be specified.

A Brief Description of the Works to be Performed for a Day:
Time of day/night in the field will be explained and given.

ANNEX 3. Type Inventory Results Report

Type Inventory Results Report Format and Descriptions

Report Author(s):
The name and surname of the author(s) will be written.

Species with Conservation Priority (s) and Habitat Requirements:
Latin and Turkish names of the species with conservation priority, threat categories and habitat requirements will be written.

Dates of the Inventory Study:
The date range of the inventory study will be written as day / month / year.

Realized Daily Field Plan:
Realized daily field plan will be entered in the table below. The village / settlement name near the areas will be indicated for each of the different sampling areas visited on the same day and the region and sampling area number will be written. Short descriptions of how the data in the sampling areas are collected will also be written in the Work Done section.

Day	Field Starting Time	Field Ending Time	Areas to be Visited (A nearby settlement name and region number on the map)	Work done

Data Collected on Species with Conservation Priority:
(In this section, each species with conservation priority will be included separately)

It will be briefly explained how many different sampling areas have been reached by the inventory study, how many records of species with conservation priority have been collected and how they have been documented.

The original of the inventory forms filled in the field will be added to the end of the report. The forms of the information contained in these forms will be filled in and added to the report on CD.

Observations for the Area and Species with Conservation Priority:
(In this section, each species with conservation priority will be included separately)

The overall status of the areas where species with conservation priority exist will be evaluated. The habitats and threats, if any, will be indicated on the basis of different regions where sampling areas are located. The areas where the most suitable habitats exist for the species with conservation priority and the explanations related to this will be written briefly. Other critical observations will be written for the species, area and habitats.

Conservation Proposals for Species with Conservation Priority in the Field in the Light of Observations:
(In this section, each species with conservation priority will be included separately)

Recommendations for continuity species with conservation priority in the area and conservation of existing habitats will be written. Among these recommendations, especially those related to forestry will be explained.

ANNEX 4. Other Elements of Biodiversity Candidate Field Inventory Form

Candidate Field Form

Integration of Biodiversity into Forest Management Plans

Enterprise Director

Filled by

Name of the Element in the Field

Location Information

Candidate Field No | **Name of Area or Village**

Sub-District Directorate in the Candidate Field

No. of Sub-Compartment(s) containing the Candidate Field

GPS Coordinates Defining Sampling Area

At least 3 or 4 coordinates should be written to help determine the boundaries of the area visited during fieldwork.

Zone	East	North	Zone	East	North
Zone	East	North	Zone	East	North

Other Information

Date Day Month Year **Time** Starting Ending **Height** **Dominant View**

: :

Is there general field image? Yes ☐ No ☐ Image No

Weather Conditions Sunny ☐ Cloudy ☐ Rainy ☐ Windy ☐ Other

Specifying Characteristics of the Element and Notes

The status of the characteristics specified in the Inventory section of the Planner's Guide and Introductory Pages of Other Elements of the Biodiversity should be written (for example; for a candidate site with a wealth of wood species: number and names of arboreal species; for old growth forest: presence of planted dry, overturned trees and old trees, status of stratification and other characteristics should be specified, information from Chiefs and other officials should be noted.)

ANNEX 5. Other Elements of Biodiversity Inventory Planning Report Format

Other Elements of Biodiversity Inventory Plan Report Format and Explanations

Explanation of the OEB to be Recorded in Inventory and How They Are Determined:
The names of the OEB to be recorded in inventory will be written.

A brief explanation will be given for each of the elements of how these OEB are identified in the Enterprise (GIS preliminary study, meeting with the Enterprise, literature).

Name of Expert:
Name and surname of the expert who will make the inventory will be written.

Name(s) of Person(s) to Accompany the Expert:
If there is any other researcher (s)/assistant(s) to accompany the expert, their name and surname will be written.

Inventory Study Start and End Dates:
The date range of the inventory study will be written as day/month/year.

Map showing the planned destinations for inventory:
A map showing the candidate sites prepared in line with the information gathered from the modelling expert, enterprise directorate experts and other sources (other experts) will be provided.

Daily Field Plan:
Daily field plan will be entered in the table below.

Day	Field Starting Time	Field Ending Time	Areas to be Visited (A nearby settlement name and region number on the map)	Work done

Brief Description of the Works to be Conducted in the Candidate Areas for a Day:
It will be explained how to spend a day in the field and to determine whether the candidate site where the relevant element is located has the characteristics of this element, separately for each element.

ANNEX 6. Other Elements of Biodiversity – Inventory Results Report Format

Other Elements of Biodiversity Inventory Results Report Format and Explanations

Report Author (s):
The name and surname of the author (s) will be written.

The OEB examined:
It will be noted which OEB are identified (and subject to field studies) in the Enterprise. Unlike the inventory plan, information will be provided on a new OEB that is identified during field studies, or on OEB that are thought to exist but understood not to exist through field studies.

Dates of the Field Study:
The date range of the field study will be written as day / month / year.

Realized Daily Field Plan:
Information about the daily field studies performed will be entered in the table below. Brief descriptions of the works done in the candidate area will also be written in the section Work Done.

Day	**Field Starting Time**	**Field Ending Time**	**Areas to be Visited** (A nearby settlement name and region number on the map)	**Name of OEB in the Candidate Area**	**Work Done**

Data Collected on OEB:
A summary of the information collected from the candidate sites examined for each different element in the field study will be given (how many different elements have been identified, how many total candidate areas have been visited, and what type of data has been collected for each different element etc).

The original of the inventory forms filled in the field will be added to the end of the report. The forms of the information contained in these forms will be filled in and added to the report on CD.

Observations on the Site and the OEB:
(In this section, each OEB identified and evaluated in the area will be included in each species with conservation priority separately.)

For each of the candidate sites visited, information will be provided on the status of the OEB on the site (such as to what extent and amount the characteristics of the element is present in the site or whether it has the characteristics required for selection). The reasons for whether or not the candidate site is reserved for the relevant OEB (explanation of whether the candidate site meets the requirements) will be listed.

Conservation Proposals for Species with Conservation Priority in the Field in the Light of Observations:
(Will be included separately for each OEB)
In terms of candidate areas, recommendations of forestry and other aspects will be given in order to preserve the characteristics of the areas proposed to be reserved for the relevant OEB. Any pressure and threats to these areas, if any, will be listed.

ANNEX 7. Table for Forest Species with Conservation Priority

IUCN Categories
LC: Least Concern
NT: Near Threatened
VU: Vulnerable
EN: Endangered
CR: Critically Endangered

7.1. Table for Forest Species with Conservation Priority

No	Name of the Species	Name of the Species (In Latin)	Endemism	IUCN National Red List Category
Plants - Woody				
1	Balkan maple	*Acer hyrcanum* subsp. *reginae-amaliae*	Endemic	EN
2	Acer cappadocicum subsp. divergens	*Acer divergens*	Endemic	VU
3	(Cytisus gueneri)	*Cytisus gueneri*	Endemic	CR
4	(Genista sandrasica)	*Genista sandrasica*	Endemic	EN
5	(Gonocytisus dirmilensis)	*Gonocytisus dirmilensis*	Endemic	EN
6	(Colutea melanocalyx subsp. melanocalyx)	*Colutea melanocalyx* subsp. *melanocalyx*	Endemic	EN
7	Sageretia spinosa	*Sageretia spinosa*	Regionally Endemic	VU
8	Aleppo Pine (Pinus halepensis)	*Pinus halepensis*	Regionally Endemic	VU
9	Trojan fir	*Abies nordmanniana* subsp. *equi-trojani*	Endemic	NT
10	Flueggea anatolica Gemici	*Flueggea anatolica*	Endemic	CR
11	Rhododendron ungernii	*Rhododendron ungernii*	Regionally Endemic	VU
12	Epigaea gaultherioides	*Epigaea gaultherioides*	Regionally Endemic	VU
13	Amygdalus kotschyi	*Amygdalus kotschyi*	Regionally Endemic	VU
14	Cerasus erzincanica	*Cerasus erzincanica*	Endemic	CR
15	Field rose	*Rosa arvensis*	Regionally Endemic	VU
16	Pyrus anatolica	*Pyrus anatolica*	Endemic	EN
17	Pyrus yaltirikii	*Pyrus yaltirikii*	Endemic	EN
18	Serik Cab (Pyrus serikensis)	*Pyrus serikensis*	Endemic	EN
19	Sweetgum (Liquidambar orientalis) tree	*Liquidambar orientalis*	Endemic	VU
20	Lonicera nummulariifolia subsp. Glandulifera	*Lonicera nummulariifolia* subsp. *glandulifera*	Endemic	NT
21	Alnus glutinosa subsp. betuloides	*Alnus glutinosa* subsp. *betuloides*	Endemic	NT
22	Alnus glutinosa subsp. Antitaurica	*Alnus glutinosa* subsp. *antitaurica*	Endemic	NT
23	Betula browicziana	*Betula browicziana*	Endemic	VU

7.1. Table for Forest Species with Conservation Priority				
No	Name of the Species	Name of the Species (In Latin)	Endemism	IUCN National Red List Category
24	Euonymus latifolius subsp. cauconis	*Euonymus latifolius* subsp. *cauconis*	Endemic	EN
25	Zelkova (Zelkova carpinifolia)	*Zelkova carpinifolia*	Regionally Endemic	VU
26	Kasnak oak (Quercus vulcanica)	*Quercus vulcanica*	Endemic	NT
27	Pontine Oak (Quercus pontica)	*Quercus pontica*	Regionally Endemic	VU
28	Juniperus oxycedrus subsp. macrocarpa	*Juniperus oxycedrus* subsp. *macrocarpa*	Regionally Endemic	VU
29	Salix caucasica	*Salix caucasica*	Regionally Endemic	VU
30	Fraxinus pallisae	*Fraxinus pallisae*	Regionally Endemic	VU
31	Fraxinus excelsior L. subsp. coriariifolia	*Fraxinus excelsior* subsp. *coriariifolia*	Regionally Endemic	VU
32	Osmanthus decorus	*Osmanthus decorus*	Regionally Endemic	VU
Plants - Herbaceous				
33	Glycyrrhiza flavescens subsp. antalyensis	*Glycyrrhiza flavescens* subsp. *antalyensis*	Endemic	CR
34	Astragalus spitzenbergeri	*Astragalus spitzenbergeri*	Endemic	CR
35	Astragalus bozakmanii	*Astragalus bozakmanii*	Endemic	CR
36	Trigonella cassia	*Trigonella cassia*	Endemic	CR
37	Astragalus albertshoferi	*Astragalus albertshoferi*	Endemic	CR
38	Astragalus altanii	*Astragalus altanii*	Endemic	CR
39	Satureja amani	*Satureja amani*	Endemic	CR
40	Thymus cariensis	*Thymus cariensis*	Endemic	CR
41	Salvia sericeotomentosa	*Salvia sericeotomentosa*	Endemic	EN
42	Salvia nydeggeri	*Salvia nydeggeri*	Endemic	EN
43	Nepeta conferta	*Nepeta conferta*	Endemic	CR
44	Thymus pulvinatus	*Thymus pulvinatus*	Endemic	CR
45	Cyclamen mirabile	*Cyclamen mirabile*	Endemic	EN
46	Rindera dumanii	*Rindera dumanii*	Endemic	CR
47	Anchusa limbata	*Anchusa limbat*	Endemic	CR
48	Rough comfrey (Symphytum asperum)	*Symphytum asperum*	Endemic	CR
49	Alkanna dumanii	*Alkanna dumanii*	Endemic	CR
50	Gypsophila pilulifera	*Gypsophila pilulifera*	Endemic	CR
51	Silene koycegizensis	*Silene koycegizensis*	Endemic	CR
52	Acantholimon koeycegizicum	*Acantholimon koeycegizicum*	Endemic	CR

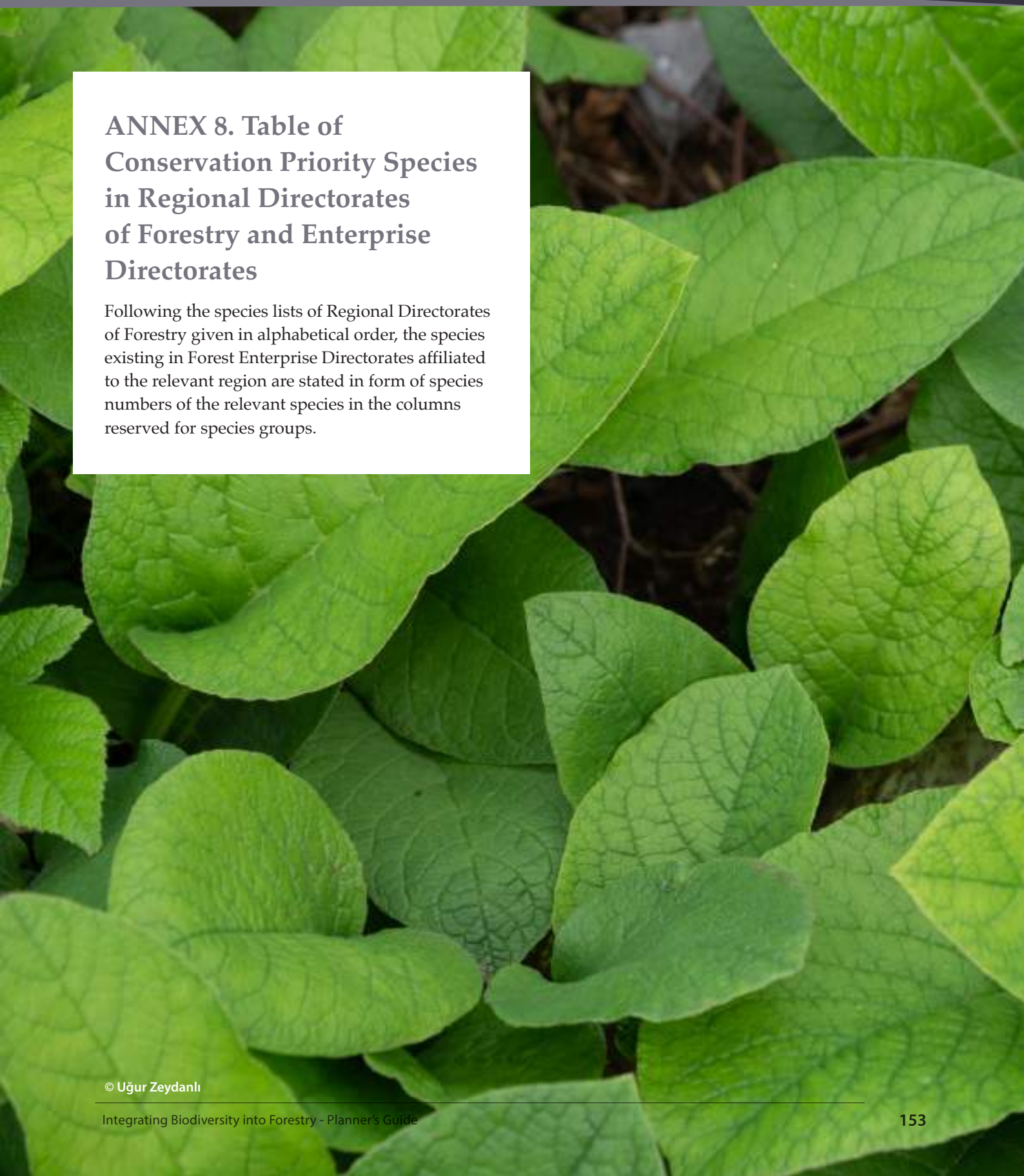
7.1. Table for Forest Species with Conservation Priority				
No	Name of the Species	Name of the Species (In Latin)	Endemism	IUCN National Red List Category
53	Acantholimon birandii	*Acantholimon birandii*	Endemic	CR
54	Rubia davisiana	*Rubia davisiana*	Endemic	CR
55	Muscari macbeathianum	*Muscari macbeathianum*	Endemic	EN
56	Scilla sardensis	*Scilla sardensis*	Endemic	CR
57	Asparagus lycicus	*Asparagus lycicus*	Endemic	CR
58	Ornithogalum microcarpum	*Ornithogalum microcarpum*	Endemic	CR
59	Chaerophyllum aksekiense	*Chaerophyllum aksekiense*	Endemic	CR
60	Ferulago isaurica	*Ferulago isaurica*	Endemic	CR
61	Ferula coskunii	*Ferula coskunii*	Endemic	CR
62	Ferula amanicola	*Ferula amanicola*	Endemic	CR
63	Prangos turcica	*Prangos turcica*	Endemic	CR
64	Allium elmaliense	*Allium elmaliense*	Endemic	CR
65	Galanthus koenenianus	*Galanthus koenenianus*	Endemic	EN
66	Galanthus cilicicus	*Galanthus cilicicus*	Endemic	EN
67	Centaurea antalyensis	*Centaurea antalyensis*	Endemic	CR
68	Centaurea ptosimopappoides	*Centaurea ptosimopappoides*	Endemic	CR
69	Anthemis macrotis	*Anthemis macrotis*	Endemic	EN
70	Anthemis adonidifolia	*Anthemis adonidifolia*	Endemic	CR
71	Ophrys isaura	*Ophrys isaura*	Endemic	EN
72	Ophrys lyciensis	*Ophrys lyciensis*	Endemic	CR
73	Ophrys amanensis subsp.	*Ophrys amanensis* subsp. *iceliensis*	Endemic	CR
74	iceliensis	*Verbascum freynii*	Endemic	CR
75	Verbascum freynii	*Verbascum prusianum*	Endemic	CR
76	Verbascum prusianum	*Verbascum adenocaulon*	Endemic	CR
77	Verbascum adenocaulon	*Crocus abantensis*	Endemic	CR
78	Crocus abantensis	*Crocus adanensis*	Endemic	CR
79	Crocus adanensis	*Fritillaria forbesii*	Endemic	EN
80	Fritillaria forbesii	*Fritillaria kittaniae*	Endemic	EN

7.1. Table for Forest Species with Conservation Priority				
No	Name of the Species	Name of the Species (In Latin)	Endemism	IUCN National Red List Category
Large Mammals				
81	Fallow deer (Dama dama)	*Dama dama*	Non-endemic	EN
82	Brown bear (Ursus arctos)	*Ursus arctos*	Non-endemic	LC
83	Chamois (Rupicapra rupicapra)	*Rupicapra rupicapra*	Endemic sub-species	VU
84	European roe deer (Capreolus capreolus)	*Capreolus capreolus*	Non-endemic	LC
85	Caracal (Caracal caracal)	*Caracal caracal*	Non-endemic	LC
86	Red deer	*Cervus elaphus*	Non-endemic	LC
87	Wolf (Canis lupus)	*Canis lupus*	Non-endemic	LC
88	Eurasian lynx (Lynx lynx)	*Lynx lynx*	Non-endemic	LC
89	Wild goat	*Capra aegagrus*	Non-endemic	LC
Small Mammals				
90	Asia Minor spiny mouse (Acomys cilicicus)	*Acomys cilicicus*	Endemic	EN
91	Caucasian Mole (Talpa caucasica)	*Talpa caucasica*	Regionally Endemic	LC
92	Levantine Mole (Talpa levantis)	*Talpa levantis*	Regionally Endemic	LC
93	Major's Pine Vole (Microtus majori)	*Microtus majori*	Regionally Endemic	LC
94	Robert's snow vole (Chionomys roberti)	*Chionomys roberti*	Regionally Endemic	LC
Birds				
95	White-tailed eagle (Haliaeetus albicilla)	*Haliaeetus albicilla*	Non-endemic	CR
96	White-backed woodpecker (Dendrocopos leucotos)	*Dendrocopos leucotos*	Non-endemic	VU
97	Northern goshawk (Accipiter gentilis)	*Accipiter gentilis*	Non-endemic	NT
98	Black Woodpecker (Dryocopus martius)	*Dryocopus martius*	Non-endemic	NT
99	Cinereous vulture (Aegypius monachus)	*Aegypius monachus*	Non-endemic	EN
100	Great Spotted Woodpecker (Dendrocopos major)	*Dendrocopos major*	Non-endemic	LC
101	Eastern Imperial Eagle (Aquila heliaca)	*Aquila heliaca*	Non-endemic	EN

7.1. Table for Forest Species with Conservation Priority				
No	Name of the Species	Name of the Species (In Latin)	Endemism	IUCN National Red List Category
Amphibians and Reptiles				
102	Atıf's Lycian Salamander (Lyciasalamandra atifi)	*Lyciasalamandra atifi*	Endemic	EN
103	Bille's Lycian Salamander (Lyciasalamandra billae)	*Lyciasalamandra billae*	Endemic	CR
104	Antalya Salamander (Lyciasalamandra antalyana)	*Lyciasalamandra antalyana*	Endemic	EN
105	Fazıla's Lycian salamander (Lyciasalamandra fazilae)	*Lyciasalamandra fazilae*	Endemic	EN
106	Luschan's Salamander (Lyciasalamandra luschani)	*Lyciasalamandra luschani*	Endemic	VU
107	Marmaris Salamander	*Lyciasalamandra flavimembris*	Endemic	EN
108	White-banded Mountain Viper (Montivipera albizona)	*Montivipera albizona*	Endemic	EN
109	Pontic Adder (Vipera pontica)	*Vipera pontica*	Regionally Endemic	EN
110	Caucasian Viper (Vipera kaznokovi)	*Vipera kaznakovi*	Regionally Endemic	EN
111	Caucasian Salamander (Mertensiella caucasica)	*Mertensiella caucasica*	Regionally Endemic	VU
Butterflies				
112	Ali Bali blue (Polyommatus alibali)	*Polyommatus alibali*	Endemic	CR
113	Pearl-bordered Fritillary (Boloria euphrosyne)	*Boloria euphrosyne*	Non-endemic	LC
114	Southern Festoon (Zerynthia polyxena)	*Zerynthia polyxena*	Non-endemic	LC
115	Brown hairstreak (Thecla betulae)	*Thecla betulae*	Non-endemic	LC
116	Caucasian Festoon (Zerynthia caucasica)	*Zerynthia caucasica*	Non-endemic	NT
117	Grecian Copper (Lycaena ottomana)	*Lycaena ottomana*	Non-endemic	VU
118	Levantian marbled white (Melanargia wiskotti)	*Melanargia wiskotti*	Endemic	VU

ANNEX 8. Table of Conservation Priority Species in Regional Directorates of Forestry and Enterprise Directorates

Following the species lists of Regional Directorates of Forestry given in alphabetical order, the species existing in Forest Enterprise Directorates affiliated to the relevant region are stated in form of species numbers of the relevant species in the columns reserved for species groups.



Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
ADANA	ADANA	8		85, 87, 89		97		118
	FEKE		68	86, 87		95, 96, 97, 98, 100, 101		
	KOZAN	8, 10, 22		84, 87		95, 96, 97, 98, 100, 101		
	OSMANİYE	15, 22		82, 84, 86, 87		95, 97, 98, 100		
	POS		60, 61, 76	82, 84, 86, 87		95, 96, 97, 98, 100, 101		
	POZANTI		66	82, 84, 86, 87		96, 97, 98, 100, 101		
	SAİMBEYLİ		66, 68	82, 86, 87		95, 96, 97, 98, 100, 101	108	
	KADİRLİ		53	84, 86, 87		95, 96, 97, 98, 100	108	
	KARAİSALI			85, 86, 87, 89		96, 97, 98, 100		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
AMASYA	AMASYA			84, 87	92, 93, 94	96, 97, 99, 100, 101		
	BAFRA	30		82, 85, 87, 89	92	96, 97, 99, 100, 101		
	ÇORUM			82, 84, 86, 87		96, 97, 99, 100, 101		
	KARGI			85, 86, 87		96, 97, 98, 99, 100, 101		
	İSKİLİP			84, 86, 87		97, 99, 100, 101		
	NİKSAR			82, 83, 84, 86, 87, 89	92, 93, 94	96, 97, 98, 100, 101	111	
	SAMSUN	30		82, 86, 87, 89	92, 93, 94	96, 97, 99, 100, 101		
	TOKAT			84, 86, 87		97, 99, 101		
	VEZİRKÖPRÜ			84, 85	92, 93, 94	96, 97, 98, 99, 100, 101		
	ALMUS			82, 84, 86, 87		97, 101		
	ERBAA			82, 83, 86, 87, 89	92, 93, 94	96, 97, 98, 100, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
ANKARA	ANKARA			82, 86, 87		97, 99, 100, 101		
	BEYPAZARI			82, 83, 84, 87, 89		95, 97, 98, 99, 100, 101		
	ÇAMLIDERE			82, 84, 86, 87		97, 98, 99, 100, 101		113
	ÇANKIRI			82, 84, 86, 87		97, 98, 99, 100, 101		
	ÇERKEŞ			82, 84, 86, 87		97, 98, 99, 100, 101		
	ILGAZ			84, 86, 87		97, 98, 99, 100, 101		113
	KIZILCAHAMAM		72	82, 84, 86, 87		97, 98, 99, 100, 101		113
	NALLIHAN		35	82, 83, 84, 87, 89		95, 97, 98, 99, 100, 101		
	ESKİPAZAR			82, 83, 87, 89	92	96, 97, 98, 99, 100, 101		
	KIRIKKALE			82, 84, 86, 87		99, 101		
	KIRŞEHİR		48	82, 84, 86, 87		99, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
ANTALYA	AKSEKİ			84		95, 96, 97, 98, 100, 101	102	
	ALANYA		57, 65	82, 84, 86, 87		95, 96, 97, 98, 100, 101	102	117
	ANTALYA	7, 18, 20	48, 58	82, 84, 86, 87		95, 96, 97, 100, 101	103, 104	
	ELMALI		46, 7	82, 85, 86, 87, 89		95, 97, 100, 101		
	FİNİKE	7	34, 42, 52, 55, 62	82, 86, 87		95, 96, 97, 100, 101	106	
	GAZİPAŞA			82, 84, 87, 89		95, 96, 97, 98, 100		117
	GÜNDOĞMUŞ			82, 85, 87, 89		95, 96, 97, 98, 100, 101	102	117
	KAŞ	19, 2		82, 84, 86, 87		95, 96, 97, 100, 101	106	
	KORKUTELİ		37, 78	82, 84, 86, 87		95, 97, 100, 101	104	
	KUMLUCA	20		82, 85, 87, 89		95, 96, 97, 100, 101	103	
	MANAVGAT			82, 85, 87, 89		95, 96, 97, 98		117
	SERİK	18, 19		82, 87		95, 96, 97, 98, 100		
	TAŞAĞIL			82, 84, 86, 87		95, 96, 97, 98, 100		117

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
ARTVİN	ARDANUÇ	2		82, 84, 86, 87	92, 93, 94	97, 98, 100, 101	109, 111	113
	ARTVİN	2, 11, 23, 27, 29, 32		82, 84, 86, 87	92, 93, 94	96, 97, 98, 100, 101	109, 111	113
	BORÇKA	2, 11, 12, 23, 27, 29, 32		82, 84, 87	91, 92, 93, 94	96, 97, 98, 100	109, 110, 111	113
	ŞAVŞAT			85	92, 93, 94	97, 98, 100, 101	111	113
	YUSUFELİ	2		87	92, 93, 94	96, 97, 98, 100, 101	111	113, 115
	ARHAVİ			82, 84, 86, 87	91, 92, 93, 94	96, 97, 98, 100	109, 110, 111	
BALIKESİR	ALAÇAM			84, 86, 87		97, 98, 100, 101		
	BALIKESİR	9		82, 85, 87, 89	92	97, 98, 101		
	BANDIRMA	9		82, 85, 87, 89	92	96, 97, 98, 101		
	DURSUNBEY		43	82, 86, 87		97, 98, 99, 100, 101		
	EDREMİT	9		82, 87, 89	92	97, 98, 101		
	SINDIRGI			82, 85, 87, 89		97, 98, 100, 101		114
	BİGADİÇ			82, 83, 87, 89		97, 98, 100, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
BOLU	AKÇAKOCA			82, 84, 86	92	96, 97, 98, 100		
	ALADAĞ			84, 86, 87	92	95, 97, 98, 99, 100, 101		
	BOLU	24		82, 84, 87	92	95, 96, 97, 98, 99, 100, 101		113, 114, 116
	DÜZCE			82, 83, 87, 89	92	96, 97, 98, 100, 101		114, 116
	GEREDE			82, 84, 87, 89	92	95, 96, 97, 98, 99, 100, 101		
	GÖYNÜK			82, 85, 87, 89	92	95, 97, 98, 99, 100, 101		
	KIBRISCIK			82, 84, 86, 87		95, 97, 98, 99, 100, 101		
	MENGEN			85, 89	92	96, 97, 98, 99, 100, 101		116
	SEBEN			82, 85, 87, 89		95, 97, 98, 99, 100, 101		
	MUDURNU			82, 85, 87, 89	92	95, 97, 98, 99, 100, 101		113, 114, 116
	YIĞILCA		75	82, 83, 84, 87, 89	92	96, 97, 98, 100		
	GÖLYAKA			82, 84, 87, 89	92	96, 97, 98, 100, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
BURSA	BİLECİK			82, 83, 84, 87, 89	92	95, 96, 97, 98, 99, 100, 101		
	BURSA			82, 84, 86, 87	92	96, 97, 98, 99, 100, 101		113, 114
	İNEGÖL		73	84, 87	92	96, 97, 98, 99, 100, 101		
	KELES			82, 84, 86, 87	92	96, 97, 98, 99, 100, 101		
	MUSTAFAKEMALPAŞA			82, 83, 84, 86, 87, 89	92	96, 97, 98, 99, 101		
	ORHANELİ			82, 84, 86, 87	92	96, 97, 98, 99, 101		
	YALOVA			86, 87	92	98		
ÇANAKKALE	AYVACIK			87	92	98, 101		
	BAYRAMİÇ	9		82, 85, 87, 89	92	97, 98, 101		
	BİGA			82, 83, 84, 87, 89	92	97, 101		
	ÇANAKKALE			82, 84, 86, 87	92	95, 97, 101		
	KEŞAN			82, 84, 86, 87		95, 101		114
	YENİCE	9		87	92	97, 98, 101		
	ÇAN	9		82, 84, 86, 87	92	97, 98, 101		
	KALKIM	9		86	92	97, 98, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
DENİZLİ	ACIPAYAM	20		85, 89		95, 96, 97, 100, 101		
	ÇAL			82, 84, 86, 87		95, 97, 99, 100, 101		
	ÇAMELİ			82, 84, 86, 87		95, 96, 97, 100, 101	105	
	DENİZLİ			84, 87		97, 99, 100, 101		
	ESKERE			82, 83, 84, 87		95, 96, 97, 100, 101		
	TAVAS			82, 83, 84, 86, 87		95, 97, 100, 101		
	UŞAK	16		85, 87, 89		97, 98, 99, 100, 101		
ELAZIĞ	BİNGÖL	17, 21		82, 84, 86, 87		101		
	BİTLİS	21		82, 84, 87		101		
	ELAZIĞ			82, 83, 87, 89		95, 101		
	HAKKARİ	13, 25		85, 87, 89		95		113
	VAN			87, 89		101		113
	TUNCELİ			81		100, 101		
	MALATYA			82, 85, 87, 89		95, 101		
	MUŞ	25	37	82, 83, 84, 87, 89		101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
ERZURUM	ERZİNCAN	14		82, 84, 87, 89		100, 101		
	ERZURUM	2, 12, 21		82, 83, 87, 89	92, 93, 94	97, 100, 101	111	113
	OLTU	2		82, 84, 86, 87	92, 93, 94	97, 100, 101	111	
	SARIKAMIŞ			82, 85, 87, 89	92	101		113
	ŞENKAYA			85, 87, 89	92	101		115
	AĞRI			85, 87, 89		101		
	ARDAHAN	25, 27, 29		82, 84, 86, 87	92, 93, 94	95, 97, 100, 101	111	113
	IĞDIR			86, 87		101		
	KARS	31	48	82, 84, 86, 87	92	95, 101		113
	REFAHİYE			82, 84, 86, 87		95, 97, 100, 101		
ESKİŞEHİR	AFYONKARAHİSAR	26		82, 87, 89		95, 97, 99, 100, 101		
	MİHALIÇCIK			82, 85, 87, 89		95, 97, 98, 99, 100, 101		
	ESKİŞEHİR			82, 84, 87, 89		95, 97, 98, 99, 100, 101		113, 114
	ÇATACIK			82, 84, 86, 87		95, 97, 98, 99, 100, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
GİRESUN	GİRESUN	32		82, 84, 87	92, 93, 94	96, 97, 98, 100, 101	111	
	ORDU			82, 84, 86, 87	92, 93, 94	96, 97, 98, 100, 101	111	113
	ŞEBİNKARAHİSAR			82, 85, 87, 89	92, 93, 94	97, 98, 100, 101	111	
	TİREBOLU	32		84	92, 93, 94	96, 97, 98, 100, 101	111	
	ÜNYE			81, 82, 85, 87, 89	92, 93, 94	96, 97, 98, 100, 101	111	113
	AKKUŞ			82, 84, 86	92, 93, 94	96, 97, 98, 100	111	
	ESPİYE	32		82, 83, 86, 87, 89	92, 93, 94	96, 97, 98, 100, 101	111	
	DERELİ			82, 84, 87	92, 93, 94	96, 97, 98, 100, 101	111	116
	MESUDİYE			82, 85, 86, 87, 89	92, 93, 94	96, 97, 98, 100, 101	111	113, 116
	KOYULHİSAR			82, 84, 86, 87	93, 94	95, 97, 98, 100, 101	111	
ISPARTA	BURDUR			82, 84, 86, 87		95, 96, 97, 99, 100, 101		
	EĞİRDİR	6, 26		82, 83, 87, 89		95, 96, 97, 98, 100, 101		
	GÖLHİSAR	1, 5, 20	44	82, 84, 87, 89		95, 96, 97, 100, 101		
	ISPARTA	19		84		95, 96, 97, 100, 101		
	SÜTÇÜLER	6	44	82, 85, 87, 89		95, 96, 97, 98, 100, 101		
	BUCAK	19		82, 84, 86, 87		95, 96, 97, 100, 101		
	DİNAR			82, 85, 87, 89		95, 97, 99, 100, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
İSTANBUL	BAHÇEKÖY			81, 82, 85, 87, 89	92	100		
	ÇATALCA	30		82, 84, 86, 87	92	95, 96, 97, 98, 100, 101		
	DEMİRKÖY			84, 87	92	95, 96, 97, 98, 100, 101		115
	İSTANBUL			84, 86, 87	92	100		114
	KIRKLARELİ			82, 84, 86, 87	92	95, 96, 97, 98, 100, 101		
	VİZE			87, 89	92	95, 96, 97, 98, 100, 101		
	KANLICA			82, 85, 86, 87, 89	92			114
	ŞİLE			82, 85, 87, 89	92			
	EDİRNE			82, 83, 87, 89		95, 96, 97, 101		
	TEKİRDAĞ			84	92	95, 96, 97, 98, 100, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
İZMİR	BAYINDIR			82, 85, 87, 89		95, 97, 98, 101		
	BERGAMA	9		82, 87, 89		97		
	DEMİRCİ			87		97, 98, 99, 100, 101		
	GÖRDES			85, 87, 89		97, 98, 101		
	İZMİR			87		95, 98		
	MANİSA		54	82, 85, 87, 89		98, 99, 101		
	AKHİSAR			82, 84, 86, 87		97, 101		
	MENDERES	28		82, 85, 89		95, 97, 98		
KAHRAMANMARAŞ	ANDIRIN	8, 1		82, 84, 87		95, 96, 97, 98, 100	108	112
	ANTAKYA			82, 86, 87		95, 97, 98, 100		118
	GÖKSUN	22	36, 38, 59	82, 84, 87, 89		95, 97, 98, 100, 101	108	
	KAHRAMANMARAŞ			84, 87		95, 98, 100, 101	108	
	DÖRTYOL			82, 85, 87, 89		95, 97, 98, 100		
	KİLİS		40	82, 84, 86, 87		95, 98, 100		
	GAZİANTEP			82, 86, 87		95, 98, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
KASTAMONU	ARAÇ			82, 84, 86, 87		96, 97, 98, 99, 100, 101		
	AZDAVAY			82, 85, 86, 87, 89	92	96, 97, 98, 100, 101		
	CİDE			82, 84, 86, 87	92	96, 97, 98, 100		
	ÇATALZEYTİN			82, 84, 86, 87	92	96, 97, 98, 100		
	DADAY			82, 84	92	96, 97, 98, 100, 101		113
	İHSANGAZİ			84		96, 97, 98, 99, 100, 101		
	İNEBOLU			84	92	96, 97, 98, 100		
	KASTAMONU	29		82, 84, 86, 87	92	96, 97, 98, 99, 100, 101		
	KÜRE			82, 85, 87, 89	92	96, 97, 98, 100, 101		
	TAŞKÖPRÜ			82, 84, 86, 87	92	96, 97, 98, 99, 100, 101		
	TOSYA			82, 84, 86, 87		97, 98, 99, 100, 101		113

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
KASTAMONU	SAMATLAR		56, 72	82, 84, 86, 87		96, 97, 98, 100, 101		
	PINARBAŞI			82, 84, 86, 87	92	96, 97, 98, 100, 101		
	BOZKURT			82, 84, 86, 87	92	96, 97, 98, 100		
	KARADERE			82, 87, 89		96, 97, 98, 99, 100, 101		
	HANÖNÜ		56	87	92	96, 97, 98, 100, 101		
	AYANCIK	24		82, 84, 86, 87	92	96, 97, 98, 100		
	BOYABAT			82, 84, 86, 87	92	96, 97, 98, 99, 100, 101		
	DURAĞAN			82, 85, 86, 87, 89	92	96, 97, 98, 99, 100, 101		
	SİNOP			82, 86, 87	92	96, 97, 98, 100		
	TÜRKELİ			82, 86, 87	92	96, 97, 98, 100		
	GERZE			82, 84, 87, 89	92	96, 97, 98, 99, 100		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
KAYSERİ	KAYSERİ		51	82, 84, 86, 87		95, 96, 97, 98, 100, 101	108	
	NEVŞEHİR		66, 76	82, 84, 86, 87		101		
	NİĞDE			82, 83, 87, 89		97, 98, 101		
	YOZGAT		74	82, 83, 84, 86, 87, 89		97, 99, 100, 101	108	
	AKDAĞMADENİ			82, 84, 86, 87		97, 99, 100, 101		
	SİVAS			82, 86, 87		95, 97, 100, 101	108	
KONYA	BEYŞEHİR			82, 83, 84, 87, 89		95, 97, 98, 100, 101		
	ERMENEK		45	82, 84, 87, 89		95, 97, 98, 100, 101		
	KONYA	26	47	82, 84, 86, 87		95, 97, 99, 100, 101		
	AKSARAY		48	84, 86		101		
	KARAMAN	26		84, 87		97, 98, 100, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
KÜTAHYA	DOMANİÇ			85, 86, 87, 89		96, 97, 98, 99, 100, 101		113, 114
	EMET			82, 83, 87, 89		97, 98, 99, 100, 101		
	GEDİZ			82, 84, 87, 89		97, 98, 99, 100, 101		
	KÜTAHYA	26		82, 85, 87, 89		95, 97, 98, 99, 100, 101		
	SİMAV			82, 87, 89		97, 98, 99, 100, 101		
	TAVŞANLI			85, 86, 89		97, 98, 99, 100, 101		
MERSİN	ANAMUR			82, 84, 86, 87		95, 96, 97, 98, 100		
	GÜLNAR		48	82, 85, 87, 89		95, 97, 98, 100, 101		118
	MERSİN		69	81, 82, 85, 87, 89		96, 97, 98, 100, 101		
	MUT		64, 71	82, 83, 84, 87, 89		95, 97, 98, 100, 101		
	SİLİFKE			87	90	95, 97, 98, 100, 101		118
	TARSUS	10		81, 82, 85, 87, 89		96, 97, 98, 100, 101		118
	ERDEMLİ			82, 83, 87, 89	90	96, 97, 98, 100, 101		118
	BOZYAZI			82, 84		95, 97, 100		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
MUĞLA	AYDIN	19		82, 84, 86, 87		95, 97, 101		
	FETHİYE	1, 19	44	82, 86, 87		95, 96, 97, 100	105, 106	117
	KÖYCEĞİZ	3, 4, 6, 19	77	82, 85, 87, 89		95, 96, 97	105	
	MARMARİS	19	39, 49, 50	81, 82, 85, 87, 89		95	107	
	MİLAS	19, 28	77	82, 85, 87, 89		95, 97, 101		
	MUĞLA	8	67	82, 85, 87, 89		95, 96, 97, 101	105, 107	
	NAZİLLİ		39	82, 83, 84, 86, 87, 89		97, 99, 101		
	YATAĞAN			82, 84, 86, 87		95, 97, 101		
	YILANLI		44, 67	82, 83, 84, 87, 89		95, 96, 97, 101		
	KAVAKLIDERE			82, 84, 86, 87		95, 96, 97, 101		
	DALAMAN	19		82, 84, 87		95, 96, 97, 100	105	
	KEMER			82, 84, 86, 87		95, 96, 97, 100, 101	106	

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
SAKARYA	ADAPAZARI			84, 85, 87, 89	92	96, 98		
	AKYAZI			82, 84, 86	92	95, 96, 97, 98, 100, 101		
	GEYVE			82, 84, 87	92	95, 97, 98, 99, 100, 101		
	HENDEK			84	92	96, 97, 98, 100		
	İZMİT			87	92	96, 98		
	KARASU			84, 85, 86, 87, 89	92	96, 97, 98		
	GÖLCÜK			82, 84, 87, 89	92	96, 98		
ŞANLIURFA	BATMAN			82, 85, 87, 89		101		
	MARDİN			82, 85, 87, 89				
	ŞANLIURFA			85		95, 101		118
	ŞIRNAK			82, 85, 87, 89		95		
	ADIYAMAN			85, 87, 89		95, 101		
	DİYARBAKIR			82, 85, 87, 89		95, 101		
	SİİRT	13, 25		82, 87, 89		95, 101		

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
TRABZON	MAÇKA	23, 32	41	82, 85, 87, 89	92, 93, 94	96, 97, 98, 100, 101	111	113
	PAZAR	11, 12, 27, 32		82, 84, 86, 87	91, 92, 93, 94	96, 97, 98, 100, 101	111	113
	RİZE	27		82, 86, 87	91, 92, 93, 94	96, 97, 98, 100, 101	111	
	SÜRMENE	12, 25, 27		82, 86, 87, 89	92, 93, 94	96, 97, 98, 100, 101	111	
	TORUL		63	82, 84	92, 93, 94	96, 97, 98, 100, 101	111	113
	TRABZON			82, 84, 86, 87	92, 93, 94	96, 97, 98, 100	111	113
	BAYBURT			85, 87, 89		97, 100, 101	111	
	GÜMÜŞHANE			85, 87, 89	92	97, 100, 101	111	113

Regional Directorate of Forestry	Forest Enterprise Directorate	Plants - Woody	Plants - Herbaceous	Large Mammals	Small Mammals	Birds	Amphibians and Reptiles	Butterflies
ZONGULDAK	BARTIN			82, 85, 87, 89	92	96, 97, 98, 100		
	DEVREK			82, 84, 87	92	96, 97, 98, 100, 101		
	DİRGİNE			86, 87, 89	92	96, 97, 98, 100, 101		116
	EREĞLİ	30		82, 84, 87, 89	92	96, 97, 98, 100		
	KARABÜK	24		84, 86, 87, 89	92	96, 97, 98, 99, 100, 101		113
	ULUS			85, 87, 89	92	96, 97, 98, 100		
	YENİCE	9		87	92	97, 98, 101		
	ZONGULDAK	24, 3		82, 83, 87, 89	92	96, 97, 98, 100		
	SAFRANBOLU			82, 86, 87	92	96, 97, 98, 100, 101		113

Integrating Biodiversity into Forestry
Planner's Guide

ISBN 978-605-06990-1-2
9 786050 699012
www.dkm.org.tr