

ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

The research focused on finding management methods better equipped to efficiently balance wood production and biodiversity conservation in Southern Sweden. Our case study area Kronoberg County has 13,700 small-scale forest owners and a landscape perspective is often lacking. In collaboration with the County Administrative Board (CAB), ALTERFOR scientists simulated that long-term effects of important conservation measures that could prospectively be integrated in the CABs work with green infrastructure in Sweden. On the other hand, active climate change mitigation will most likely increase the future demand for wood. To meet this challenge, while at the same time protecting substantial areas for biodiversity, the timber production needs to increase. Together with the forest owner association Södra the research team has found alternatives that, when used simultaneously, can increase the growth by 30%. These findings were actively discussed in workshops with forestry actors in the county that through their advisory services play a great role in shaping forest management practices. Increasing the share of broadleaves was identified as the most important focus area for biodiversity. The suggested measures include retaining border zones rich in broadleaves; establishing mixed forests; and plantations of oak. The easiest way to increase production is to invest in better forest regeneration with the current methods. Fertilization, exotic tree species and clones of spruce are other possible alternatives, however, associated with higher implementation barriers. To sum up, the ALTERFOR team identified a number of stand level measures that, in due proportions on landscape level, will enable an efficient balancing between timber production and biodiversity.

SWEDEN
SVERIGE

ALTERNATIVA MODELLER OCH BESLUTSUNDERLAG FÖR FRAMTIDENS SKOGSSKÖTSEL

Vår forskning har fokuserat på att hitta skötselmetoder som är bättre utrustade för att effektivt balansera virkesproduktion och bevarandet av biologisk mångfald i södra Sverige. Vår fallstudie Kronobergs län har 13,700 privata skogsägare och här saknas det ofta ett landskapsperspektiv. I samarbete med länsstyrelsen så simulerade ALTERFOR forskare de långsiktiga effekterna av viktiga bevarandeåtgärder som i framtiden kan integreras i länsstyrelsens arbete med grön infrastruktur i Sverige. Å andra sidan, aktivt arbete med att motverka klimatförändringarna kommer troligen att öka den framtida efterfrågan på virke. För att kunna möta denna utmaning och samtidigt kunna skydda betydande arealer för biologisk mångfald så måste man öka tillväxten. Tillsammans med skogsägarföreningen Södra så har vi tagit fram alternativ, som tillsammans kan öka tillväxten med 30 %. Dessa resultat diskuterades under workshops med skogliga aktörer i länet som genom sina rådgivningsinsatser har stor påverkan på skogsskötseln. Att öka mängden löv identifierades som det viktigaste fokusområdet för den biologiska mångfalden. Våra föreslagna åtgärder inkluderar att lämna lövrika kantzoner vid avverkning, etablera blandskog och plantera ek. Det enklaste sättet att öka produktionen är att investera i bättre föryngringar med dagens vedertagna metoder. Gödsling, exotiska trädslag och kloner av gran är andra möjliga alternativ, som dock är förknippade med högre implementeringsbarriärer. Sammanfattningsvis, vi har identifierat ett antal åtgärder på beståndsnivå, som i rätt proportioner på landskapsnivå kan möjliggöra en mer effektiv balansering av virkesproduktion och bevarandet av den biologiska mångfalden.

ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

The overall research goal of the ALTERFOR project is to provide improved and new approaches in forest management that are robust enough to address the challenges of the 21st century. As the ten current Forest Management Models applied in the Case Study Area Podpolanie face challenges ranging from uncertainties of climate change and the complex dynamics of evolving global markets pressure, the TUZVO team proposed two alternative models – a model of mixed management concepts and a model of flexibly aged forests.

The modelling results revealed that differences in provisioning of ecosystem services under various scenarios while considering multiple influences are very small after 100 years. Especially differences among management concepts in comparison with today's situation are small. Climate change, which was modelled via differences in multi-criterial values, has a greater impact. Based on the results it is expected that there will be improved wood production, regulatory services and biodiversity in the future. In contrast, reduction in provisioning water, in carbon sequestration and in recreation is expected. This tendency was general and thus predictable across all scenarios. Finally, the results revealed that changes in the nature protection and in the forest ownership structure will have zero impact on provisioning of ES in the tested time span.

Important actors in the CSA Podpolanie are forest and nature conservation authorities, forest owning municipalities, small-scale forest owners, a few large-scale forest owners, various regional or local associations, non-governmental organizations, recreationists who use forests for biking or hiking, hunters, and a few timber processing companies. The state-owned enterprise Forests of the Slovak Republic, branch Kriváň, is the most important forestry player in the CSA Podpolanie, managing almost 23 000 ha of forest land in the CSA (76%). Considering preliminary results and their discussion with stakeholders at two workshops, the further research steps of the TUZVO team will focus on optimization of ecosystem services provision under effect of considerably increased nature protection and more extreme behavior of the forest owners. The potential of the ALTERFOR project solution is to present alternative approaches to the forest management planning as well as to modernize the concept of ecosystem services provided by forests along with approaches for their assessment and quantification.

ALTERNATÍVNE MODELY A ROBUSTNÁ PODPORA ROZHODOVANIA PRE OBHOSPODAROVANIE LESOV V BUDÚCNOSTI

Celkovým výskumným cieľom projektu Alterfor je poskytnúť lepšie a nové prístupy v obhospodarovaní lesov, ktoré sú dostatočne robustné na riešenie výziev 21. storočia. Keďže desať súčasných modelov hospodárenia, bežne aplikovaných v oblasti experimentálneho územia Podpolanie čelí viacerým výzvam - od neistôt súvisiacich so zmenou klímy až po komplexnú dynamikou tlaku na globálnych trhoch, tím TUZVO navrhol dva nové, alternatívne modely hospodárenia - model zmiešaných hospodárskych koncepcií a model flexibilného lesa vekových tried.

Výsledky modelovania odhalili, že rozdiely v poskytovaní ekosystémových služieb v rôznych scenároch s ohľadom na viaceré vplyvy sú po 100 rokoch hospodárenia relatívne malé. Najmä vplyv zmeny koncepcie hospodárenia v porovnaní so súčasnou situáciou je malý. Väčší vplyv má zmena klímy, ktorá sa prejavuje rozdielom vo viacerých multikriteriálnych hodnotách. Na základe výsledkov sa očakáva, že v experimentálnom území bude pravdepodobne v budúcnosti zlepšená produkcia dreva, regulačné služby a biodiverzita. Na rozdiel od toho sa očakáva zhoršenie zásobovania vodou, sekvestrácia uhlíka a rekreácia. Táto tendencia bola všeobecná a preto predvídateľná vo všetkých scenároch. Výsledky tiež odhalili, že zmeny v rozsahu ochrany prírody a v štruktúre vlastníctva lesa budú mať nulový vplyv na zabezpečenie ES v testovanom časovom rozpätí.

Dôležitými aktérmi v experimentálnom území Podpolanie sú orgány lesného hospodárstva a ochrany prírody, obecné a spoločenské lesy, štátne lesy, rôzne regionálne alebo miestne združenia, mimovládne organizácie, rekreanti, ktorí využívajú lesy na cykloturistiku alebo pešiu turistiku, poľovníci a niekoľko spoločností na spracovanie dreva. Štátny podnik Lesy Slovenskej republiky, závod Kriváň je najvýznamnejším aktérom, ktorý spravuje takmer 23 000 ha lesnej pôdy (76%). Po zohľadnení predbežných výsledkov a ich prediskutovaní so zástupcami cieľových skupín na dvoch workshopoch, v ďalšom výskume sa výskumný tím TUZVO sústreďuje na optimalizáciu poskytovania ekosystémových služieb v podmienkach zvýšených požiadaviek na ochramu prírody a extrémnejšieho správania vlastníkov lesov.

Potenciál riešenia projektu ALTERFOR potom spočíva v prezentácii alternatívnych prístupov k plánovaniu obhospodarovania lesov ako aj modernizácii koncepcie ekosystémových služieb poskytovaných lesom spolu s prístupmi k ich hodnoteniu a kvantifikácii.

SLOVAKIA
SLOVENSÁ
REPUBLIKA



ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

The research focused both on building methodological framework to assess the performance of current and alternative forest management models taking into consideration different futures and validating several forestry alternatives important for Lithuania nowadays. First, we simulated forest resource development and forest use under conditions of several climate mitigation scenarios, assuming that current forest management practices are continued. The main findings were that the increased efforts for climate change mitigation correlated positively with profits from forestry activities, while the reduction of biodiversity values was smaller despite the changes in growth and harvesting intensity. Then, we thoroughly investigated the potential influence of alternative management approaches on long-term sustainability of forestry in terms of balance of ecosystem services from forested landscapes. As the management alternatives, we considered more adaptive approaches in choosing the rotation ages, increasing the share of deciduous tree species in spruce dominating forests and the costs and benefits of increasing the areas with no active forest management. Even though the study was conducted on a relatively small area representing less than 4% of the country's area, direct participation of a key forestry actor in Lithuania – the state company “State forest enterprise” - enabled both the visibility of our findings and the transferability of our approaches. To sum up, the ALTERFOR team demonstrated that modern forestry might be able to ensure both the sustainability of ecosystems and maximization of the contribution forests make to the welfare of people and the country.

LITHUANIA
LIETUVA

ALTERNATYVŪS MIŠKININKAVIMO MODELIAI ATEITIES MIŠKAMS

Šiuo tyrimu siekėme dviejų tikslų – sukurti dabar naudojamų bei norimų pasiūlyti miškininkavimo metodų patikros metodinius principus, kurie atsižvelgtų į neišvengiamai besikeičiančias ateities sąlygas, o taip pat įvertinti šiuo metu Lietuvai svarbias miškininkystės alternatyvas. Pirmą, buvo sumodeliuota miško išteklių ir miškininkystės raida esant įvairiems klimato kaitos ir žmonijos pastangų tai kaitai sušvelninti scenarijams bei darant prielaidą, kad dabartinė miškininkavimo praktika ateityje nekinta. Pademonstravome, kad klimato kaitos švelninimo pastangos yra atperkamos didesniu pelnu iš miškininkystės veiklos, nepaisant mažesnio prieaugio bei kirtimų, o tuo pačiu sulėtėja su biologine įvairove susijusių vertybių mažėjimas. Po to kruopščiai įvertinome kai kurių miškininkavimo alternatyvų potencialią įtaką ilgalaikiam miškininkavimo tvarumui, kurį išreiškėme miško teikiamų ekosisteminių paslaugų paketo balansu. Nagrinėtos miškininkavimo alternatyvos sietos su adaptyvių miško kirtimo amžių pasirinkimu, lapuočių dalies eglės dominuojamuose medynuose didinimu ar potencialių Europos Bendrijai svarbių buveinių plėtojimu. Nors tyrimai apėmė tik 4% Lietuvos teritorijos, faktas, kad projekte dalyvavo VĮ Valstybinių miškų urėdija, padarė mūsų tyrimų rezultatus tiek matomais, tiek ir žinomais diegimo praktikoje prasme. Apibendrinant, ALTERFOR komanda pademonstravo, kad šiuolaikinis miško ūkis gali ne tik užtikrinti ekosistemų dinaminį tvarumą, tačiau ir išplėsti miško įnašą į piliečių bei šalies gerovę.

ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

The Italian case study for the ALTERFOR project consists of the Eastern Veneto forest areas belonging to the Lowland Forest Association (Associazione Forestale di Pianura, AFP). The area hosts mainly oak-hornbeam forests, both relict and recent ones, and coastal pine forests, all together stretching over some 300 ha. Forests stand close to semi-urban areas, highly visited/used by both tourists and locals. Research activities analysed current forest management models and identified -with the support of stakeholders- the main current and desired ecosystem services, with the aim to develop appropriate management solutions. Considering intrinsic features, location and the type of users, the study area is particularly appropriate for management solutions aimed to conservation of natural values (species and habitat biodiversity) and the provision of many cultural ecosystem services by offering recreation opportunities to a broad range of users. Though possible, timber production does not represent the main objective of forest management. Potential future management solutions have been identified and discussed via interviews, workshops and events with stakeholders that highlighted the need to develop silvicultural models based on selective harvesting, aimed to ensure a balanced coexistence of nature conservation and other functions. Within this perspective, management models will be oriented to renaturalization goals (in terms of species composition, forest structure, etc.) and the will to ensure planned and safe forest use conditions for multiple users. Besides strictly silvicultural aspects, the promotion of innovative management models sensu lato has emerged as a key issue, looking at new cooperation opportunities among different actors (private and public ones) and ways to value territories and their resources, with positive impacts on local communities and other beneficiaries, while ensuring a multifunctional forest management.

ITALY
ITALIA

MODELLI ALTERNATIVI E METODOLOGIE DECISIONALI AFFIDABILI PER LA GESTIONE FORESTALE DEL FUTURO

Il caso studio italiano del progetto ALTERFOR è rappresentato dai boschi del Veneto Orientale rientranti nell'Associazione Forestale di Pianura (AFP). Si tratta per lo più di quercu-carpineti planiziali, in parte residuali e in parte di recente creazione, e di pinete litoranee, per una superficie complessiva di poco inferiore a 300 ha. Tali boschi si trovano in aree semi-urbane, a ridosso di zone ad altissima frequentazione da parte di turisti e residenti. Le attività di ricerca hanno analizzato i modelli di gestione attuali del bosco e individuato -con il contributo dei portatori di interesse- i principali servizi ecosistemici attuali e desiderati, al fine di sviluppare soluzioni gestionali adeguate. In ragione delle caratteristiche intrinseche, della collocazione e del conseguente tipo di fruizione, l'area di studio si presta in particolare alla gestione a fini di conservazione di valori naturalistici (biodiversità di specie e habitat) e costituisce una risorsa importante dal punto di vista dei servizi culturali, offrendo opportunità di ricreazione e svago a un elevato numero di utenti. La produzione di legname, ancorché possibile, non costituisce il principale obiettivo gestionale. Possibili soluzioni gestionali future sono state individuate e discusse attraverso interviste, workshop ed eventi con portatori di interesse, nel corso dei quali è emersa la necessità di attuare modelli selvicolturali basati su tagli selettivi, finalizzati ad assicurare un'equilibrata coesistenza di funzioni di conservazione e di valorizzazione. In tal senso la gestione sarà orientata a una rinaturalizzazione delle aree (in termini di composizione specifica, struttura, ecc.) e alla possibilità di assicurare una fruizione pianificata e sicura. Al di là degli aspetti strettamente selvicolturali, è inoltre emersa la necessità di promuovere modelli gestionali innovativi in senso lato, che guardino cioè a forme di collaborazione tra attori diversi (pubblici e privati) e alla promozione di forme di valorizzazione del territorio e delle sue risorse con ricadute positive dirette sulle comunità locali e sui beneficiari esterni, mantenendo un giusto equilibrio tra le diverse funzioni del bosco.

ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

The research focuses on the analysis of trade-offs between ecosystem services to support landscape-level forest management planning under climate change scenarios. It builds from specific methodologies to estimate the value of ecosystem services indicators as well as on models to simulate stand-level prescriptions. This information is used by Pareto frontier approaches to help stakeholders select ecosystem services bundles as well as the forest programs needed to provide them.

In the Case Study Area of Vale do Sousa (CSA), most forest holdings are small and decisions are often made at holding or stand level thus precluding the benefits from joint landscape management. The most evident potential benefit from a landscape level management approach is the decrease of its vulnerability to wildfires while maintaining an adequate level of wood production.

The forest owners association and the forest owners are the direct beneficiaries from a landscape level management approach. Nevertheless, forest industries also benefit from a reduction of wood supply risk. The provision of other ecosystem services, such as biodiversity and soil protection, will benefit society as a whole by directly addressing the concerns of environmental NGO's and public administration in the CSA.

In participatory processes including workshops, stakeholders may take advantage of the integrated functionality of decision support tools to analyze trade-offs between ecosystem services and achieve a consensual landscape-level solution to the CSA management-planning problem. The tool lists the stand-level prescriptions in that solution thus providing valuable information to the forest owner. This information is influential to developing multi-objective plans that address wood supply, vulnerability to wildfires as well as the provision of other ecosystem services under climate change scenarios. It is further influential to addressing climate change adaptation and mitigation concerns.

PORTUGAL PORTUGAL

MODELOS ALTERNATIVOS, ROBUSTEZ DA TOMADA DE DECISÃO E O FUTURO DA GESTÃO FLORESTAL

A investigação foca-se na análise de trade-offs entre serviços de ecossistema apoiando o planeamento da gestão florestal à escala da paisagem em cenários de alteração climática. Esta análise baseia-se em metodologias específicas para a estimar o valor dos indicadores dos serviços de ecossistema bem como em modelos para simular as intervenções florestais ao nível dos povoamentos. Na área de estudo das ZIF do Vale do Sousa, a maioria das propriedades são de pequena dimensão e as decisões de gestão são realizadas de forma individual, dificultando a obtenção dos benefícios de uma gestão conjunta da paisagem. O exemplo mais evidente dos potenciais benefícios de uma gestão à escala da paisagem é a diminuição da sua vulnerabilidade aos incêndios florestais, mantendo um nível adequado de produção de madeira. A associação de produtores florestais e os proprietários florestais são os beneficiários directos de uma gestão ao nível da paisagem. No entanto, as indústrias florestais também beneficiam de um menor risco na obtenção de madeira. A produção de outros serviços de ecossistema tais como a biodiversidade e a proteção do solo vão beneficiar a sociedade em geral, correspondendo às preocupações das ONG's de ambiente e das entidades estatais que actuam na área de estudo.

Através de processos participativos realizados em Workshops, as partes interessadas usufruem de um sistema integrado de suporte à decisão para analisar os trade-offs e chegar a uma solução consensual para o problema do planeamento à escala da paisagem. Este sistema, identifica as intervenções florestais correspondentes à solução escolhida, fornecendo assim informação relevante para o proprietário florestal. Esta informação é determinante para o desenvolvimento de planos multi-objectivo que consideram a produção de madeira, a vulnerabilidade aos incêndios florestais bem como o fornecimento de outros serviços de ecossistema para diferentes cenários de alteração climática. É assim, também, determinante para o desenvolvimento de estratégias de adaptação e mitigação das alterações climáticas.

ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

The research deals with the question how future proof Dutch forest management is. The Dutch forest sector will face many (new) challenges in the decades to come – such as climate change, the increasing demand for biomass for energy, the changing demands from society – and the central question is how our future forest management could look like. The research, first of all, explored current forest management practices in the Netherlands. Secondly, together with stakeholders from the Dutch sector (including experts in the field of forestry such as forest managers, policy makers, scientists, researchers, and consultants), different possible new forest management approaches were established: three single-ecosystem oriented forest management approaches (biomass, quality timber, recreation) and two multifunctional approaches (climate hedging and N2000). Additionally, the effects of game were included as an important aspect in all approaches, as this was considered to be very relevant for the success or failure of all of these approaches. Stakeholders also discussed the drivers underlying the choices of forest managers as regards their future management. Particularly the vision, mission and strategy of the forest manager were seen as extremely important, next to three dominant drivers: policies, subsidies, and environmental factors (climate change, N-deposits). The new forest management approaches were evaluated for their output in terms of Ecosystem Services and compared with the ES provision of current forest management practices in order to make comparison possible, and for different possible scenarios to test for robustness. However, due to modelling issues resulting in an over- and underestimation of some of the ES indicators, no reliable answers on the long-term evaluation of the approaches can be provided yet. This is the focus of the research in the last part of the project.

THE NETHERLANDS



Het onderzoek richt zich op de vraag hoe toekomstbestendig het Nederlandse bosbeheer is. Met de vele (nieuwe) uitdagingen die de Nederlandse bossector te wachten staat – zoals klimaatverandering, de toenemende vraag naar biomassa voor energie en maatschappelijke veranderingen, is het de vraag hoe ons toekomstig bosbeheer er uit zou moeten zien. In de eerste fase van het onderzoek is het huidige bosbeheer in Nederland onderzocht. In de tweede fase zijn, in samenwerking met stakeholders uit de sector (waaronder beheerders, beleidsmakers, onderzoekers en consultants), verschillende mogelijke alternatieve vormen van bosbeheer opgesteld: drie vormen van bosbeheer met een specifieke focus op één van de Ecosysteem Diensten (biomassa, kwaliteitshout en recreatie) en twee multifunctionele vormen van bosbeheer (klimaatbestendig beheer en N2000). In alle vijf is ook expliciet de effecten van wild opgenomen, omdat dit door de stakeholders als bepalend voor het succes of falen van een bosbeheervorm werd ervaren. Stakeholders hebben ook geëvalueerd welke factoren ze als invloedrijk zien als het gaat om beslissingen over het toekomstige bosbeheer. Als belangrijkste werden missie, visie en doelstellingen genoemd. Andere invloedrijke factoren zijn beleid, subsidies en omgevingsfactoren (klimaatverandering, N-emissies). De nieuw geformuleerde bosbeheervormen zijn vervolgens geëvalueerd op basis van hun resultaten in termen van ES met als doel vergelijking met het huidige beheer mogelijk te maken. Daarnaast zijn verschillende scenario's doorgerekend om de bosbeheervormen op hun robuustheid te testen. Vanwege modelleringsproblemen is het nog niet mogelijk betrouwbare uitspraken te doen over de lange-termijn uitkomsten van de verschillende vormen van het bosbeheer. Hieraan zal in het laatste jaar van het project worden gewerkt.

ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

The German team simulated tree and forest growth both in the 100.000 ha large region Augsburg Westliche Wälder (Bavaria) and in the 100.000 ha large region Lieberose/Schlaubertal (Brandenburg) for the next hundred years in order to support forest management. Three alternative calculations show different impacts on ecosystem services by (1) multifunctional forestry, (2) maximizing timber production and (3) untouched forest development in these case study areas. For both areas, one of the main findings is that existing structure of species and age largely determine the ecosystem services produced by the forests. One Hundred years with different management practices would be too short to change the ecosystem basket substantially. Another important result is that in case of multifunctional forestry, twenty percent of the biological potential for timber production is not used. Finally, in the region in Brandenburg, untouched forests would increase the risk of fire damages.

The project team organised workshops in the case study areas and invited different forest-related actors. Forestry stakeholders and representatives from natural conservation organisations discussed the modeling results in two groups, in an atmosphere of high trust. Public and private forest owners appreciated multifunctional forestry due to the high stability and continuous supply with ecosystem services including income from timber sales. They were willing to sacrifice twenty percent timber harvest that they could produce in a more dynamic but still sustainable manner. Set asides with no management at all were strictly rejected by forest owners. In contrast to the forest owners, representatives of the nature conservation sector welcomed the alternative calculation of untouched forest development. This would mean increased biodiversity and CO₂ provision in the next one hundred years, mainly resulting from a higher share of untouched forests.

GERMANY
DEUTSCHLAND

Die je 100.000 ha umfassenden Fallstudienregionen Bayern, Augsburg Westliche Wälder und die Region Brandenburg Lieberose / Schlaubetal modellierten zum ersten Mal die Entwicklung des Waldes in den nächsten 100 Jahren. Drei alternative Szenarien zeigen die Auswirkungen auf die Ökosystemleistungen: (1) Multifunktionale Forstwirtschaft, (2) Maximale Holzproduktion und (3) Natürliche Waldsukzession. Das Hauptergebnis für beide Regionen ist, dass die Ausgangsstruktur des Waldes, abhängig etwa von den vorhandenen Baumarten und deren Alter, die Ökosystemleistungen der Wälder für die nächsten hundert Jahre weitgehend bestimmt. Für fundamentale Änderungen durch alternative Waldbauverfahren sind hundert Jahre ein zu kurz bemessener Zeitraum. Ein anderes wichtiges Ergebnis zeigt, dass multifunktionale Waldbewirtschaftung würde mit einem Verzicht von zwanzig Prozent an möglicher nachhaltiger Holznutzung einhergehen. Natürliche Waldentwicklung wiederum erhöht das Brandrisiko in der Region Brandenburg erheblich. An den Workshops nahmen staatliche Akteure, Interessengruppen und Waldeigentümer teil. Die Trennung in Akteure des Forst- und solche des Naturschutzsektors erleichterte eine konstruktive Diskussion zwischen Wissenschaft und Praxis. Öffentliche und private Waldeigentümer unterstützen das Szenario der multifunktionalen Forstwirtschaft aufgrund ihrer hohen Stabilität und ausgewogenen Ökosystemleistungen, einschließlich regelmäßiger Erträge aus dem Holzverkauf. Sie wären bereit auf zwanzig Prozent höhere Erträge zu verzichten, die eine maximal ausgelastete, aber dennoch nachhaltige Holzproduktion ermöglichen könnte. Stilllegungsflächen im Wald werden von forstlichen Akteuren abgelehnt. Akteure des Naturschutzes begrüßten das Szenario, in dem die Biodiversität durch zwanzig Prozent Sukzessionsflächen erhöht werden konnte und für die nächsten hundert Jahre auch CO₂ durch Zuwächse im Wald gebunden wird.

ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

Forests within the Gölcük Case Study Area (Case Study Area, CSA) provide many goods and services such as timber production, recreation, water production, chestnut production (NWFP), biodiversity and soil conservation. The vast majority of the CSA is owned and managed by the state forest enterprise, which is responsible for protecting forest resources and develops a nature-friendly holistic approach for the management of forest resources for multi-purpose sustainable outcomes. Different interventions have been implemented and different management models have been used, especially based on the tree species and conservation approach, to achieve desired objectives by the state forest enterprise. However, there was no mechanism to compare future outputs of conducted and alternative forest management models with the help of defined criteria under different scenarios. In collaboration with the General Directorate of Forestry, the project team analysed the main ecosystem services and displayed long-term effects of alternative and current forest management approaches. The conducted research is important for timber processing companies that directly influence the production activities within the CSA, for handmade chair producers who generally demand 3-4-years old Chestnut shoots and local people collecting chestnut (NWFP) in the state forest. The knowledge obtained in the project can help to planning investments or taking forest management decisions considering ecological aspects also by other important stakeholders. Currently, thirteen water-bottling plants supply fresh water to the residences; over fifty recreational areas serve as picnic areas and fish farms rent land from the state forest enterprise. A nature protection institution is responsible for planning, managing and improving the protected areas within the CSA.

TURKEY TÜRKİYE

GELECEK NESİL ORMAN AMENAJMAN PLANLAMALARI İÇİN ALTERNATİF SİLVİKÜLTÜREL VE PLANLAMA YAKLAŞIMLARI İLE ETKİN KARAR VERME SÜREÇLERİNİN GELİŞTİRİLMESİ

Gölcük orman ekosistemleri; odun üretimi, rekreasyon, su üretimi, odun dışı orman ürünleri, biyolojik çeşitlilik ve toprak koruma gibi çok sayıda ürün ve hizmeti topluma sunmaktadır. Çalışma alanında yer alan ormanların mülkiyetinin büyük bölümü; ormanların korunması, doğaya yakın işletilmesi ve bahsedilen ürün ve hizmetlerin süreklilik ilkesi çerçevesinde çok amaçlı planlanmasından sorumlu Gölcük Devlet Orman İşletmesi'ne aittir. Dolayısıyla, istenilen amaçlara ulaşabilmek amacıyla, orman ekosistemlerinde yapılacak müdahalelere ve alınacak kararlara paydaşların da görüşlerini alarak Gölcük Devlet Orman İşletmesi karar vermektedir. Bununla birlikte, ormanda yapılacak müdahalelerin gelecekte oluşacak ürün ve hizmetler üzerindeki etkisini göstermeye veya karşılaştırmaya yönelik elimizde bir mekanizma maalesef bulunmamaktadır. Bu projede, Orman Genel Müdürlüğü ile birlikte, halihazırda kullanılmakta olan silvikültürel yaklaşımlarla, alternatif olarak kullanılabilecek devamlı orman silvikültürel yaklaşımının farklı iklim değişikliği senaryoları altında, orman ekosistem hizmetleri üzerindeki etkileri araştırılmıştır. Bu araştırma sonucunda elde edilecek bulgular; üretim faaliyetlerini doğrudan etkileyen orman ürünleri işleyen fabrikalar, üç-dört yaşında Kestane sürgünlerini kullanan el yapımı sandalye üreten bambucular ve ticari amaçla Kestane meyvesi toplayıcılığı yapan yerel halk tarafından oldukça önemli bilgiler sunmaktadır. Bunun yanında ekolojik olarak değerlendirildiğinde ise, elde edilen ekosistem çıktılar, diğer etkili paydaşlar olan; ülke genelinde temiz su ihtiyacını sağlayan on üç su şişeleme tesisi, Gölcük Devlet Orman İşletmesinden uzun dönemli kiralama yoluyla oluşturulan piknik alanı ve balık çiftliği olarak hizmet veren ellinin üzerindeki rekreasyon alanı ile korunan alanların planlanması, yönetilmesi ve geliştirilmesi konularından sorumlu Doğa Koruma ve Milli Parklar Genel Müdürlüğü tarafından alınacak kararlarda yardımcı olabilecektir.

ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

The ALTERFOR project in Ireland focused on assessing future impacts of climate change and dynamic timber prices on western peatland forests, and on developing adaptive, alternative forest management models for these forests. The case study area (CSA), located in country Galway, is dominated by Sitka spruce (*Picea sitchensis* (Bong.) Carr.) plantations on blanket peat. The forest is mainly owned by Coillte (the Irish state forestry board) and is surrounded by land with protected status. These designations restrict the use of fertiliser, resulting in lodgepole pine (*Pinus contorta* Douglas) now being the only option for reforestation of blanket peats. Climate change will impact the growth of most commercially valuable species negatively, but it will increase lodgepole pine growth on peatlands. The impact of higher wood prices, resulting from an expanding bioeconomy to limit climate change, will make low-productivity sites marginally profitable, leading to intensified forest management. Stakeholders consulted in the CSA are Coillte, the Forest Service, private forest owners, ECC sawmill, National Parks and Wildlife Services, the Environmental Protection Agency, local angling clubs, Irish Peatland Conservation Council, and Teagasc (the state agency for research and advisory for agriculture and forestry). The new management models were developed with Coillte after stakeholder consultations and focus on planting lower densities of lodgepole pine. Some lower densities will facilitate biomass production on marginal sites and even lower densities will establish semi-open open forests on poor sites, allowing native species to regenerate naturally. Reducing stockings result in more profitable forestry and less adverse impacts on water quality as harvesting intensity is reduced. The project has facilitated discussion between stakeholders about what the future western peatland forest landscape may look like, what their preferences are, and what is feasible with regards to forest policy, economics and the biophysical site conditions.

IRELAND



ALTERNATIVE MODELS AND ROBUST DECISION-MAKING FOR FUTURE FOREST MANAGEMENT

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