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IL BOSCO: UN BENE MULTIFUNZIONALE PER FAR FRONTE AL CAMBIAMENTO CLIMATICO IN CORSO

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POSTER

ABSTRACTS

I SERVIZI ECOSISTEMICI FORESTALI: PERCEZIONE E CONSAPEVOLEZZA DELLA SOCIETA' CIVILE

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Forests are recognised at both international and community levels as a key element in combating the climate and environmental crisis. The 2030 Agenda, promoted by the United Nations, recognises the role of forests in ensuring Sustainable Development and in achieving several Goals, such as reducing inequality and hunger, combating climate change and maintaining life on Earth (2, 10, 13 and 5). Furthermore, the EU Forest Strategy 2030-a flagship initiative of the European Green Deal-highlights the role of forests in achieving climate neutrality in 2050 and reducing biodiversity loss. These contributions that an ecosystem makes to the environment and to humans have been defined by the Millennium Ecosystem Assessment as 'ecosystem services'. Since the 1960s, these services have been increasingly recognised by both civil society and the various stakeholders and decision-makers involved in land management. In recent years, the interest and importance attributed to the various ecosystem services is also accelerated by the COVID-19 pandemic situation. In this context, the aim of this research is to investigate how civil society's awareness and perception of forest services have changed in the post COVID-19 period. For this purpose, a questionnaire comparing 12 ecosystem services offered by Alpine forests was administered to 478 visitors to a valley in the Italian Western Alps. The method adopted, Best-Worst Scaling, made it possible to identify the priorities of individual valley visitors, which showed that biodiversity was the service considered most important, followed by the aesthetic beauty of the landscape and psychophysical well-being. The results also made it possible to segment the respondents, identifying five distinct groups of users. The "hedonistic" group who consider cultural services such as the aesthetic beauty of a landscape and tourist-recreational activities to be more important; the "individualist with cultural and health interests" group who are more attentive to psychophysical health and inclined to carry out activities such as forest bathing and/or forest therapy; those that are "sensitive to regulatory and utilitarian functions", which are more related to the safety and liveability of a territory, such as protection against natural hazards; those that are "climate change-sensitive", which can be attributed to Greta's generation and are attentive to ensuring a sustainable future for the next generations; and finally the "livelihood and hedonistic wellbeing" group, which are more related to the exploitation of natural resources, such as drinking water. There is therefore a general interest on the part of civil society in the intangible services provided by mountain ecosystems. In particular, it is pointed out that the modern lifestyle of outdoor recreational activities is increasingly pushing people to learn about and appreciate the cultural and psychophysical health aspects that forests can offer. Sustainable development therefore appears to be a challenge for society as a whole, also considering the lesser explored but highly topical recreational activities and functions that the forest can

offer. The research will therefore continue with an analysis of the involvement of civil society in decision-making processes on a local scale through the adoption of participatory approaches, such as focus groups, citizens' juries and public debate.

FOREST MANAGEMENT AND THE FIGHT AGAINST CLIMATE CHANGE IN EU POLICY

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There are 158 million hectares of forest (5% of the world's total) in the EU; they cover 37.7% of the EU's land area. The EU has many different types of forests, reflecting its geoclimatic diversity (boreal forests, alpine forests with conifers, etc.). Forests play a significant role with regard to both the environment and regional development. On a strictly environmental level, forests are safeguarded by their designation as protected zones by directive 92/43/ECC (the so-called 'habitat' directive, implemented by Italy in 1997), and also because they contain wild flora and fauna. 23% of European Forests form part of the ecological network "Natura 2000", and are thus subjected to special protection. Such is the case of the Białowieża forest in Poland, which was the subject of legal proceedings that finished in April 2018 with the condemnation of the Polish government, which was ordered to bring deforestation operations to a halt. In 2021 the European Commission published the new EU forest strategy for 2030, which is a key part of efforts to reduce greenhouse gas emissions by at least 55% by 2030, as called for by the European Green Deal. This makes forests one of the principal sectors for intervention in the fight against climate change. The Commission has set out a number of proposed measures aimed at increasing the size and quality of Europe's forests and improving their resilience to challenges such as climate change, while also supporting communities whose livelihoods depend on forestry. Further actions by the EU to safeguard forests have also been planned, for instance: Forest Europe; the attempt to promote the integration of agriculture and forestry within climate policies; the FLEG II program, aimed at promoting sustainable forestry management and the protection of forests in countries in the eastern EU; and the REDD+ program, aimed at reducing emissions linked to deforestation and forest degradation in Asia, Africa and Latin America. EU policy with regard to the protection of forests is thus part of the international framework for fighting climate change, within which the EU, with greater effort following negotiations for the adoption of the Paris accord, is attempting to give itself a leading role. This paper will illustrate these measures in order to ascertain whether they can contribute to the general goal of fighting climate change.

INTANGIBLE FOREST ECOSYSTEM SERVICES AND SOCIAL INNOVATION: EXPLORING THE LINK IN ITALIAN RURAL AREAS

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Forests provide fundamental economic, cultural, and emotional contributions to humankind. They create intimate bonds that go beyond mere resource exploitation, enriching the emotional and spiritual qualities of

human life. Social Innovations are grassroots processes aiming for achieving impacts beyond an individual level and towards a broader societal good. Social innovation impacts are long-term effects generated by the changes put in motion by a social innovation initiative towards new sustainable pathways. In rural areas, social innovations play a pivotal role for promoting coherent and inclusive models of territorial development. When social innovations concern the forestry sector their scope is instead gradually converging towards forest multifunctionality and intangible ecosystem services approaches, including forest-based outdoor recreation. It is however unclear the extent to which social innovation models are linked to forest intangible ecosystem services in the Italian context, especially in rural and mountain areas. This research aims at unfolding this link, building on the findings of the 2016-2020 H2020 project SIMRA (Social Innovation in Marginalised Rural Areas). The findings of this research are important as they provide useful insights on the role of social innovation initiatives in revitalizing Italian rural areas through forest intangible values.

IL RUOLO DELLA GESTIONE FORESTALE SOSTENIBILE NELLA MITIGAZIONE DEI CAMBIAMENTI CLIMATICI

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La risorsa forestale svolge un ruolo chiave nella lotta ai cambiamenti climatici attraverso lo stoccaggio temporaneo di anidride carbonica (CO₂) atmosferica nei cinque pool di carbonio previsti dall'Intergovernmental Panel on Climate Change (IPCC): biomassa epigea, biomassa ipogea, legno morto, lettiera e suolo. Al fine di migliorare il sequestro di CO₂, e conseguentemente generare crediti di carbonio (CC) con un valore riconosciuto dal mercato, è possibile realizzare interventi volti ad implementare Natural Climate Solutions (NCS) in grado di: (1) ridurre la CO₂ legata all'uso del suolo ai cambiamenti nell'uso del suolo; (2) catturare e immagazzinare temporaneamente ulteriore CO₂ dall'atmosfera; (3) migliorare la resilienza degli ecosistemi naturali. In riferimento alle NCS relative alle foreste, esistono sei principali opzioni percorribili: implementare interventi di afforestazione e riforestazione; ridurre la conversione delle foreste in altri usi del suolo; gestire le foreste naturali; migliorare gli impianti di arboricoltura; ridurre l'utilizzo dei combustibili legnosi; limitare e gestire gli incendi boschivi. All'interno di queste opzioni, il miglioramento della gestione forestale rappresenta per l'Italia una delle soluzioni più interessanti in quanto consente alle foreste di aumentare lo stoccaggio del carbonio, assicurando al contempo la produzione di legname di qualità nel lungo termine. Al fine di sperimentare interventi innovativi di gestione forestale nell'ambito delle NCS, il progetto LIFE14 CCM/IT/905 "Recovery of degraded coniferous Forests for environmental sustainability Restoration and climate change Mitigation" (FoResMit) ha implementato due tipi di diradamento (dal basso e selettivo) nella foresta di Monte Morello in provincia di Firenze. La foresta di Monte Morello è il risultato di un intervento di rimboschimento avviato negli anni '20 e conclusosi negli anni '70 del secolo scorso che ha interessato una superficie di oltre 1000 ettari. Le principali specie impiegate nel rimboschimento sono state conifere (78% del totale delle specie impiegate) quali il cipresso comune (*Cupressus sempervirens* L.), il cipresso dell'Arizona (*Cupressus arizonica* Greene), il pino nero (*Pinus nigra* J.F. Arnold) e il pino bruzio (*Pinus brutia* Ten.), mentre

per il restante 22% sono state impiegate latifoglie autoctone. Negli anni successivi al rimboschimento, la foresta di Monte Morello è stata sottoposta solo sporadicamente alle necessarie cure colturali (sfolli e diradamenti), pertanto, allo stato attuale si presenta come una foresta degradata. In tale contesto, il progetto LIFE FoResMit è intervenuto al fine di implementare una serie di cure colturali (diradamenti) volte a migliorare la struttura del popolamento e al contempo il suo ruolo nella mitigazione dai cambiamenti climatici. Nello specifico, il diradamento dal basso ha asportato le piante del piano dominato (tra il 15% e il 20% dell'area basimetrica) e le piante morte in piedi, mentre il legno morto a terra non è stato rimosso; invece il diradamento selettivo ha selezionato le piante candidate (circa 100 soggetti a ettaro), scelte in base al vigore e alla vitalità, asportando i soggetti competitori dei candidati (tra il 30% e il 40% dell'area basimetrica). In quest'ultimo tipo di diradamento, le piante morte in piedi e tronchi a terra con diametro maggiore di 30 cm e appartenenti alle prime due classi di decomposizione sono state asportate. Tutto il materiale raccolto durante gli interventi di diradamento è stato impiegato per la produzione di cippato utilizzato per la produzione di calore in un impianto di teleriscaldamento ubicato a 15 km dall'area forestale. In termini di mitigazione dai cambiamenti climatici, i risultati del presente studio hanno messo in luce come a seguito del diradamento dal basso il C-stock della foresta di Monte Morello è diminuito di 145 tCO₂ ha⁻¹ (96% del cambiamento nella biomassa epigea e ipogea e 4% nel legno morto), mentre a seguito del diradamento selettivo il C-stock è diminuito di 220 tCO₂ ha⁻¹ (95% del cambiamento nella biomassa epigea e ipogea e 5% nel legno morto). Tuttavia, nonostante un'iniziale perdita di C-stock, i due interventi proposti sono stati in grado di generare un incremento di C-sequestration pari a 37,80 tCO₂ ha⁻¹ anno⁻¹, a seguito del diradamento dal basso, e di 25,18 tCO₂ ha⁻¹ anno⁻¹, a seguito del diradamento selettivo. Sulla base di questi dati, in un arco temporale di 4 anni (diradamento dal basso) e 9 (diradamento selettivo) anni il C-stock asportato inizialmente con gli interventi gestionali viene completamente rigenerato, dando luogo ad un bilancio emissioni-assorbimenti positivo negli anni successivi. In termini economici, considerando i prezzi correnti di un CC sul mercato volontario, gli interventi proposti possono generare in pochi anni un flusso monetario compreso tra i 15 e 40 € ha⁻¹ anno⁻¹, variabile sulla base del tipo di intervento implementato e delle condizioni forestali iniziali. In riferimento alla multifunzionalità, gli interventi selvicolturali implementati hanno migliorato in modo sinergico, oltre alla funzione di mitigazione dai cambiamenti climatici, anche altre due importanti funzioni forestali: la fruizione turistico-ricreativa e la protezione idrogeologica.

IL LEGNO COME RISORSA STRATEGICA: CRITICITA' E PROPOSTE FRA SFN E PNRR

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In Italy an average of 11 mil cubic metres of raw wood is produced, just 12% of the total demand, 64% of which is wood for energy use. In our country very little is extracted, on average only 0.4 mc/ha/year (about 10% of what the forests produce each year according to the latest IN FCC report). The Increasing trend of wood for energy use is not only limited to Italy, but in contrast to other European countries, we are only increasing this

amount thanks to government incentives to produce energy from biomass. This situation has its advantages as well as its drawbacks, but a market like this tends to favour quantity over quality in wood production. However, this situation is manifested in a regulatory framework that has been changing in recent years (approval of the TUFF, SFN, European Forestry Strategy 2030, etc.). Important issues have been introduced into these regulations: active sustainable forest management, support for forest certification, a push towards associations and towards multi-year third-party management contracts (some positive experiences are already underway), professionalisation of forest workers and companies, etc. This picture shows both the evident weakness of the upstream sectors and their poor connection with the downstream sectors, and the fact that attention to the environmental aspects of forest resources continues to prevail over the productive ones (it is enough to see the increasing constraints to which forest resources have been subjected in the last hundred years). On the other hand, it is true that the possibility offered by the multi-functionality of forest resources is becoming more and more important as they can supply both market goods, which can activate a diversified series of supply chains, and ecosystem services, which have important collective repercussions and for which forest owners are still not compensated. This reality, together with the length and cumbersome nature of the authorisation procedures for forest harvesting, has over time constituted one of the main causes of the uncertainty of private investments in forestry, which has been accompanied by a very low percentage of planned and in the current situation, effectively managed forests. In the face of the important innovations introduced by the new regulatory framework, we must ask ourselves what resources should be used to implement them? The TUFF and SFN are clear: no additional resources are foreseen for their implementation, but the Regions (the delegated bodies in forestry matters) must find the resources (RDP, ROP, etc.) in their own financial allocations. This will be extremely difficult given the "political" weight of forestry with respect to the agricultural sector in the RDP (only 5% of the resources were dedicated to "forestry" measures in the past programming period) and the same situation applies to the RDP measures aimed at fostering research and technology transfer to the business world (which are already minimal compared to the RDP budget, but infinitesimal for the forestry sector), despite the role identified by the National RDP for the forestry sector. The situation does not improve in the RDP, where the attention devoted directly to the forest sector is practically non-existent. This is a peculiar fact for our country since, despite the high attention devoted to the green revolution and to the ecological transition, we have been rather "distracted" compared to other European countries, some of which have provided for specific measures and investments dedicated to the forest sector. What to do?

A) If sustainable forest management involves a series of activities that can be included in the circular economy, it is necessary to implement measures and interventions that favour the completion of the circularity of the system and exploit the potential given by the multifunctionality of forest resources, which can activate diversified supply chains that are of interest to many sectors of our economic system.

B) Promoting active forest management and increasing quality harvesting from semi-natural forest with a cascade approach: this objective is achieved through a series of factors such as streamline authorisation procedures, encouraging forest certification and chains of custody for processed products, encouraging the professionalisation of workers and enterprises, providing adequate regional planning and more productive planning tools, etc.

C) Finally, consolidate the plantation sector (specialised plantations, reforestation, etc.).

In conclusion, we can certainly say that we have the right instruments to do so. The question we must ask ourselves is: is there a real and strong political will on this issue? If the political will is translated into resources made available to implement what is envisaged, some doubts persist.

MODELLI PER LA VALUTAZIONE ECONOMICA DEI SERVIZI ECOSISTEMICI NEI TERRITORI AGRO-FORESTALI: ESEMPI APPLICATIVI PER LA STIMA DEL VALORE RICREATIVO E DELLA CACCIA IN TOSCANA

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The Ecosystem Services (ES) generated by agro-forestry territories represent a set of intangible goods which, in the last few years, have been receiving increasing interest from the scientific community. The increased environmental awareness of users of agroforestry territories is pushing public opinion towards a greater awareness of the additional services generated by agricultural and forestry components. Rural areas are no longer seen as contexts for the mere production of market goods such as wheat, wood, undergrowth products, etc., but are also seen as generators of services for human wellbeing: recreational, environmental protection, climate change mitigation, hydrogeological instability reduction, etc. For this reason, local administrators and the scientific community are increasingly stimulated in the search for methods capable of quantifying these additional benefits that are not subject to market transactions. This is the case of Cultural Ecosystem Services (CES) which generate mainly intangible benefits from natural and anthropogenic ecosystems. In the literature, Ecosystem Services can be classified into three categories: provisioning Ecosystem Services, such as food and fresh water; regulating Ecosystem Services, which affect e.g. climate, flooding and disease; and Cultural Ecosystem Services (CES), which include recreation and spiritual and religious values [1,2] and contribute substantially to human well-being. Although different names have been used to define CES [3], most authors agree that they are always an interdependent function between people and the environment [4,5]. In all studies, the most difficult challenge related to the evaluation of CES is certainly represented by their quantification, especially in monetary terms. Indeed, it is a category of non-market, non-material and non-monetary services that are not traded on the market [6]. For this reason, some authors consider that it is still difficult for the scientific community to translate the value of CES into economic terms [7-9]. On the other hand, numerous studies have shown that the economic value generated by the category of recreational services is extremely relevant [10-12] and can sometimes exceed the value of agricultural and forestry production [13,14]. This value is particularly relevant in the forests and cultivated lands of Italy [15]. The aim of this study is to illustrate some methodologies able to estimate the recreational function for two particular categories of CES users, namely hunters and hikers on thematic routes linked to pilgrimage. The two researches were conducted through a survey on the territory of the province of Siena (Tuscany) with the administration of online questionnaires. Through these surveys it was possible to analyse the hunting habits of hunters and hikers. These surveys were carried out with two different questionnaires but they are based on the same indirect method, i.e. the Travel Cost Method (TCM), which represents the most used method in literature for the evaluation of CES [16-21]. We will

see the main components of the research, the methodological details and the econometric model used for the statistical regression of the collected data (Negative Binomial Model) as well as the results achieved. The comparison of the results with the evaluation of the values of the market products generated in the examined territory may give interesting indications for the definition of possible strategies aimed at improving the management of the territory with a view to sustainability and resilience of human activities.

ETHIOPIAN FORESTS AMONG NATIONAL POLICIES, INSTITUTIONAL CHANGES, AND POLITICAL DISCOURSE

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The current presentation aims to present some historical milestones and key aspects of national forest policy in Ethiopia. The country's highlands have experienced ancient human occupation, sedentary agriculture and extensive cattle herding activities, and population pressure. Such phenomena, precise economic and political choices of exploitation, have resulted in heavy deforestation, and subsequent environmental degradation, a dynamic often stripped of its political value, perceived and recounted as natural and inevitable by farmers and institutions. Estimates of the loss of forest cover are different, but all agree in denouncing an exhausting and massive deforestation, which according to the Global Forest Watch is far from stopped. Indeed, in 2010, Ethiopia had 12.4Mha of tree cover, extending over 11% of its land area and in 2020, it lost 18.0kha of tree cover. However, people, more precisely the interviewed in the foreword in East Gojam Zone, in Amhara Region where I am conducting my research, -a not secondary clarification considering the federal structure of the country, -are perceiving a growth of trees in their environment. Beginning in the 1970s, during the socialist regime, the first steps forward in the development of forest policy in Ethiopia were taken, under the impetus of international influences, which became stronger in the 1990s, after the fall of the DERG. Thereby, forests and their management have begun to take on the form of a complex arena, defined by a vision of forests as multiple-uses, valuable for maintenance of genetic diversity, watershed protection, and regulation of climate change and by multi-level governance that includes non-state actors, from powerful international institutions to research centres, cooperation agencies and NGOs. In particular, the link between forests and climate change has become even more explicit since 2009 with the Prime Minister Meles Zenawi, under which Ethiopia has become a leading country in climate diplomacy at regional and continental level, who formulated the ambitious plan of Climate Resilience Green Economy (CRGE) in 2011. This plan, remained largely unimplemented in ten years, has the objective of building climate resilient green economy by 2030, intervening with a specific strategy on forests and agriculture, recognized on the one hand as essential for the economy, and on the other, as the biggest contribution sectors to greenhouse gas emissions. The integrated vision of agriculture and forests of the CRGE, has only formally failed with the subsequent PM Hailemariam Desalegn, who gave great emphasis to forests in the country, establishing in 2013 a specific ministry called Ministry of Environment and Forest and then, in 2015, renamed and restructured Ministry of Environment, Forest and Climate Change. The changes in its legal formation from the regional level down, never really materialized, because no office, staff, or budget was ever prepared that could deal exclusively with forestry, which effectively remained a department under the Agriculture Bureau or Office. The world of forestry policies and practices has never had enough time and

strength to strengthen itself, given the process of institutional restructuring that has gone through it and is still ongoing. In 2018, Premier Abiy Ahmed downgraded the ministry to the Environment, Forest, and Climate Change Commission, then in 2021 placed forests under the Ministry of Agriculture and further downgraded the commission to an authority, establishing the Ethiopian Environmental Protection Authority. This is a significant political fact, coupled with Ethiopia's underwhelming participation in COP26, which clashes with its presentation as a green leader after its re-greening project that, as noted above, impressed the country's public. In July 2019, Abiy launched the Green Legacy campaign for the country's green development, which aims to plant 200 million trees in one day and break the planting record held by India. The tree planting campaign is not a new practice in Ethiopia, though none of its predecessors aimed to break the world record, a goal ultimately not achieved due to lack of data. Before, the target was simply reforestation, now also to capture the attention of the country and the world. The campaign has been strongly linked to Abiy's image, and the gesture of planting new trees eloquently represents the premier's desire to tie his mandate to the Ethiopia's Rebirth. The idea of presenting a sustainable development project for Ethiopia, capable of capturing international aid for which there is so much competition among developing countries and internally, among different institutions to access climate finance, emphasizing its green commitment, is incontinuity with previous policies. But during his election campaign in June 2021, Abiy gave that content a greater meaning: the practice of re-greening is linked to the choice of his party and leadership and serves to "adorn Ethiopia". Such political discourse, with respect to forest management per se, is quite a step backwards, and former commissioner Dr. Feleke's exhortation that "it's time to walk our talks".