

## **EXTERNALITIES AS A BASIS FOR ECONOMIC EVALUATION OF WILD FRUITS**

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### **ABSTRACT**

Regardless of their type, or whether they are higher (vascular) plants or fungi, wild fruits used for human nutrition have other indirect values besides of their market value. This value is commonly characterised under the term "ecosystem values". Such a characteristic is mostly based on the fact that this group of fungi and plants are naturally grown, man does not cultivate or process them, but is only involved in the process of their collection. In this respect, there is a need for constructing models and techniques for their economic evaluation, which is different from the product market values, or market values solely based on the supply and demand relation of certain products. Wild fruits belong to the group of renewable natural resources which represent part of the biological funds and according to their location they are usually placed in the group of "public goods", thus their exploitation is causing series of external effects (externalities). For this purpose, it is necessary to identify and specify these externalities in order to create an efficient system for management and protection of these resources. The aim of this paper is to analyze the theoretical concepts and methods that can provide base for building a system for sustainable use of wild fruits. Additional contribution will be provided in form of directions for their efficient management on the basis of theoretically and practically sublimated best practices.

**Key words:** wild fruits, externalities, economic valuation, protection.

### **INTRODUCTION**

Wild plants, which are grown in natural and uncultivated habitats, are part of nature and its biodiversity and belong to certain ecosystems. They are distinguished mostly because of the fact that they are naturally grown; that is, man does not cultivate or process them, but is only involved in the process of their collection in specific regions. This group of wild plants include different plant species, such as medicinal and aromatic plants, fungi and lichens, wild fruits (raspberries, blackberries, blueberries, strawberries, etc.), as well as different forest trees. Regardless of their type or whether they are higher (vascular) plants or fungi, wild plants used for human nutrition, besides their market value, have other indirect values and these are commonly recognized under the term "ecosystem values".

Wild plants belong to the group of renewable natural resources which represent part of the biological funds, and due to their characteristics are usually placed in the group of "public goods", thus their exploitation is causing series of external effects, i.e. externalities). Externalities are manifestation of market failure, i.e. an economic occurrence where the relationships between the economic agents are not all mediated through markets due to the structure of the property rights. Externality also exists where a consumption or production activity has unintended effects on others for which no compensation is paid (Menkiw, 2007).

In economic terms and in accordance to the classical division of natural resources, wild plants can be classified as renewable natural resources for which: i) it is often difficult to determine the economic value; ii) there is an existing danger that they will be exploited up to

the critical limit of their disappearance (major negative externality); (iii) are important for the biodiversity (major positive externality).

North Macedonia has a long tradition for collection of wild fruits, especially practiced by local population in the less developed and mountainous areas. However, this is considered mostly as secondary activity, carried out mainly for satisfying own consumption needs and sometimes the surplus is marketed through the buyout centers that operate in those regions, but mostly on seasonal basis. Often the buy-out of wild plants is regulated by the National park, i.e. only companies with approval by the national parks can buy-out the commercially recognized wild plants. Beside the collection for own consumption, most of the collectors recognize an economic potential in the collection of wild plants, especially blueberry, which is also mostly purchased by the buy-out companies (Janeska Stamenkovska and Martinovska Stojcheska, 2019). The country has large potential of wild plants and rich biodiversity, though those capacities have not been sufficiently explored yet. Considering the importance of the wild plants for the forests biodiversity, proper collection plays an important role. In this context, different factors affect the wild plants yields and could threaten and endanger their potential, among which unstable weather conditions, climate change effects, improper collection, etc. Hence, they represent an exhaustive renewable natural resource and their management and protection is very important and a responsibility of the State, since the use of these type of resources is not limited only to the direct users and beneficiaries, but to all inhabitants of the country, as public goods. This exploitation of wild fruits has an external economic effects (externalities), as it comes to a situation in which certain group of people utilize a good that belongs to each individual in the country.

This paper addresses the growing importance of this group of products for North Macedonia, which, due to the modern lifestyle and consumer preferences, have a rising market demand, thus the threat of their disappearance is also increasing and a strategy for their exploitation is needed. There is an obvious absence of an institutional framework in accordance to the three theoretical concepts: legal, economic and technical aspects (e.g. procedures, quantitative limitations – transferable quotas, etc.). Therefore, this paper aims to identify and define the existing positive and negative externalities in the case of wild fruits and their un-monetary values in order to propose strategic directions for their efficient management on the basis of theoretically and practically sublimated positive experiences. In the paper, we focus on the non-economic values (externalities) of wild fruits in order to provide basis for building a system for sustainable use of wild fruits in the Republic of North Macedonia.

## **MATERIALS AND METHOD**

Being one of the few papers focusing on the topic of non-economic values (externalities) of wild fruits, and one of the first addressing this topic in the Republic of North Macedonia, this paper provides a theoretical and practical sublimation of the concepts that define their different aspects. Consideration relevant literature is essential research background that specifies, maps and consider the research area, motivate the aim and validate the research question. This approach would not only provide an overview of the theories and models, but also provide evidence on a meta-level and reveal areas in which more research is needed, which is a critical component of creating theoretical frameworks and building conceptual models (Snyder, 2019).

In this paper, most of the relevant and available literature on this topic was reviewed, and was used as a base for developing an appropriate model which includes the applicable externalities' concepts and economic evaluation techniques to the Macedonian context. In this respect, the research is based on secondary data, i.e. most of the official documents, Strategies and connected Laws and by-laws in North Macedonia, as well as research studies and reports related to the wild plants bio-potential and their economic use were also revised. Thus, this

research provides the framework and represents a basis for the further analysis of the effects of wild plants externalities.

## **DEFINITION, EXTERNALITIES AND POTENTIALS OF WILD FRUITS IN NORTH MACEDONIA**

### *Externalities – theoretical background*

The externality concept is multifaceted and many definitions and classifications are found in the literature (Merlo and Croitoru, 2005). Nevertheless, externalities are primarily a type of market failure, or the impact of one persons' actions on the well-being of a bystander (Chapter 10, Menkiw, 2007). An externality occurs if one person's activity, affects the well-being of an uninvolved person. Externalities can be negative, where the effect on the people not involved in the transaction is adverse, and positive, when the effect is beneficial for the people not directly involved in the transaction (Menkiw, 2007; Ver Eecke, 1999).

As part of the forests ecosystem, wild fruits can be characterized as "public goods", and as such they exemplify a typical case of goods with positive externalities in different aspects. This primarily means that, when a unit of wild fruits is produced, everyone has the right to consume it, whether they pay or do not pay compensation for these products. Public goods are an extreme case of goods with positive externalities, since two aspects define them: i) non-excludability, i.e. once the good has been produced, there is no possibility to exclude anyone or anyone's benefit from using the goods and ii) non-rivalry, the consumption of the good by one additional person does not reduce anyone else's enjoyment of the good (Menkiw, 2007).

Because of the non-excludability characteristic of public goods, the market properties do not function, thus market failure occurs. Additionally it is difficult to measure the exact benefit each person receives from these public goods, since the benefits may differ and are hard to measure. This is known as the "free-rider" problem. Everyone has this incentive, so this pricing system does not function well (Menkiw, 2007; Ver Eecke, 1999). Commonly, it is governments' obligation to try to solve these market failures by some kind of taxes because of the difficulty of relying on private markets or voluntary contributions to produce or provide an efficient amount or efficient use of these public goods. Additionally, there is a case of "common pool resource" (sometimes called "common resources" or just "commons"), which have most of the characteristics of a pure private good. (Menkiw, 2007). In this case, negative externality problems result from the existence of a resource owned by many people (members of a community), such as forests and wild fruits, that anyone can use, thus these resources would be over utilized. This is mostly because people using "commons" have no incentive to reduce their use of this resources and thus to preserve some of the "commons", because anyone else could use it in the meantime. In this way it would not be preserved for the future. Therefore, there is no motivation to conserve or protect the resource from overuse. This is the negative externality of the common pool resources, i.e. their availability to several people who can use them at any time, eventually can cause inefficient overuse of these resources. This is known as "the tragedy of the commons" (Hardin, 1968), and possible solutions to this overuse might include licensing (restricting) their use or "privatizing" them so that the owner has an incentive to restrict usage to an efficient level (Menkiw, 2007).

National forests and forest habitats are closest to the concept of common pool resources and the problem with the negative externalities faced by these resources; given that they could be (over)used by all citizens, for any purpose of their will, with no restriction and free of any charge. This means that there are unpriced, negative effects that are demarked as the costs that are difficult to identify and even more difficult to be compensated (*ibid*).

The significances of biodiversity for humans (direct and indirect) as well as nature values are termed ecosystem goods and services (including ecosystem functions). The value of

ecosystem goods and services is vast, but it cannot always be expressed in conventional, monetary terms. Nevertheless, it is very important to specify these non-monetary values in order to gain better understanding of all involved stakeholders and as a base for developing firm policies and strategies for these resources (Melovski, 2012).

Positive and negative externalities as well as the other forest outputs are related to the Total Economic Value (TEV) of forests (Croitoru *et al.*, 2001). According to Merlo and Croitoru (2005) (Figure 1), forest outputs are also seen as market, potential market and non-market values or private and local goods and public goods and externalities.

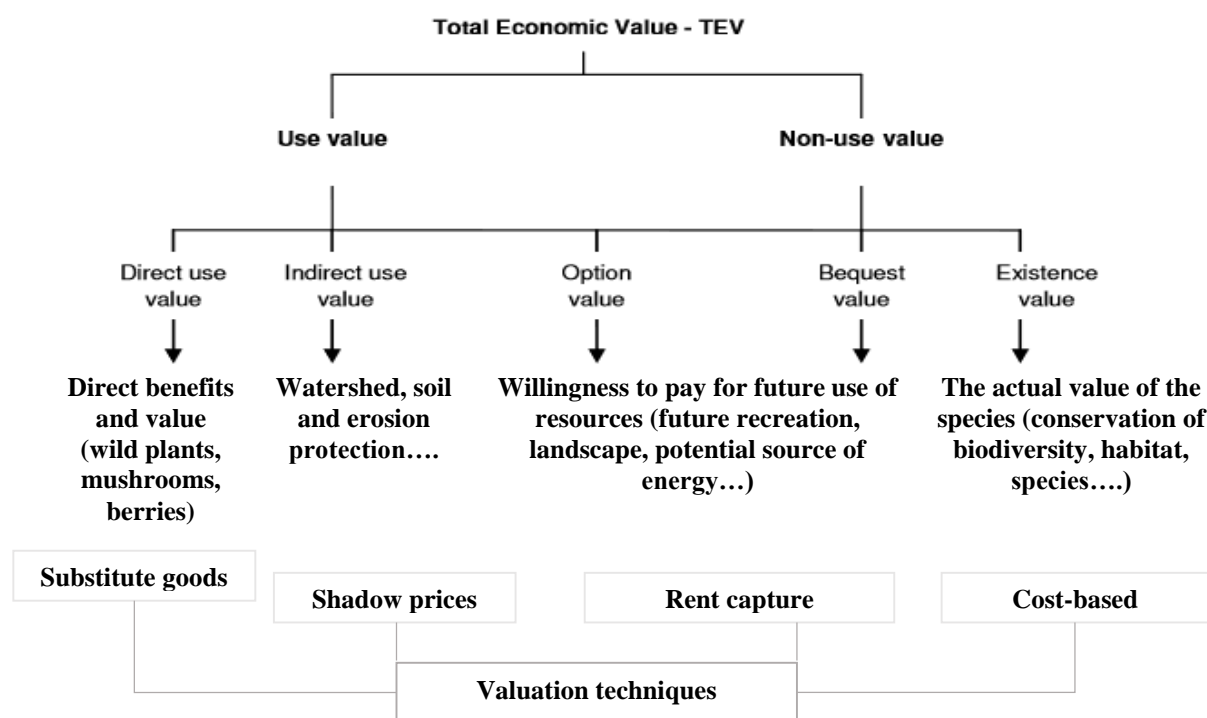


Figure 1. Total Economic Value (TEV)

Source: Adapted from Croitoru (2007)

Most direct use values are market private goods, while the various use and non-use values become potential market and nonmarket public goods and externalities (Merlo and Croitoru, 2005; Garrod, and Willis, 1999). TEV is often applied to identify and in a way quantify values of different components having the tangible and intangible characteristics of natural resources such as forests (Öztürk *et al.*, 2009; Merlo and Croitoru, 2005). This valuation can be used in the valuation of wild fruits which are often part of the forest habitats.

The term “wild fruits” recapitulates different kinds of: higher (vascular) plants, fungi, mosses and lichens or parts of them, which are collected in the nature, thereby meeting the standards of organic production, serving human needs and being subject to trade (Jakimovski, 2014). They belong to the group of renewable natural resources which represent part of the biological funds, and their externalities can be exhibited through different ecological, biological and aesthetic benefits that are available for all people, without or for a very small compensation paid for these benefits. Wild fruits are often overlooked and governments fail to distribute funds for their maintenance. Consequently, the recognition of these public goods and their externalities are also marginalized (Croitoru, 2007).

*Externalities and the wild fruit potential in North Macedonia*

The collection of native wild species in North Macedonia, especially in its less developed and mountainous areas, is an activity that has been traditionally practiced by the local population. For most of the population, this activity is not a primary economic activity and source of income, but has always been considered to be practiced primarily for meeting the nutrition needs, and in some instances, the surplus is marketed through buyout centers.

Most of the local population traditionally collects wild plants, meaning that are not the initial collectors in the community for this activity. A recent study found that the average age of the collectors is around 47 years, indicating that collecting wild plants is not attractive for younger generations, thus threatening the retaining and transferring of the traditional character of such activity (Janeska Stamenkovska and Martinovska Stojceska, 2019). On the other side, most of them collect relatively small quantities of certain plants, except of those with commercial character such as mushrooms or some wild fruit species. However, the collection of wild plants contribute significantly to the rural livelihood, as well as cultural value. Very often the collectors belong to the most vulnerable members of the society, so the collection of wild plants can be recognized as a supplementary income for those households, providing seasonal work for the rural population. Moreover, considering the relatively limited market for these plant species, the collection of wild fruits in the country is not considered as a considerable commercial and economic activity, thus the share of these products into the Macedonian economy have been often neglected.

According to the National plan for organic production 2013-2020, the country has great potential of wild herbs, mushrooms, forest fruits, etc. In this context, the following are mostly collected: juniper berries, lichen (oak and pine), bear grape leaf, yellow St. John's wort, Shar-mountain tea, red St. John's wort, marjoram, wild blackberry, moth root and flower of primrose, valerian root, sweet fennel fruit, barberry, blueberry, raspberry, blackberry, marigold, marshmallow, marshmallow, seed and nettle root (MAFWE, 2013). Although the use of natural resources such as plants, fungi, lichens etc., is regulated with the Law on Nature Protection (OG, 2004), and the list of wild species whose collection is regulated with special MOEPP (Ministry of environment and physical planning) permission is determined; there is still no record of all collected quantities of wild fruits in the country. It is important to emphasize that the collectors might have license obtained from the National Park, but also from the public enterprise which operate with the forest. According to the Public Enterprise for Forest Management (PEFM, 2019) during the period from 2012 to 2018, the number of registered enterprises and collectors of wild fruits has constantly declined. From the registered 50 enterprises and 2,216 individuals (collectors/harvesters) in 2012, the number decreased to 15 enterprises in 2018 i.e. 396 individual collectors in 2017.

However, the exported values of these products show an increasing trend, thus this economic activity and the increasing trend of exported values (from 1,805,014 euro in 2014 to 2,813,018 euro in 2018) is gaining on importance for the overall economy (Table 1) (UNCTAD, 2017).

Worth mentioning is that the trade chains of these species are relatively complex, so end users might be unaware of the wild collection as a source for the ingredients, as well as for the country of origin. This is so since most of the trades of wild plants are in raw or processed form (UNCTAD, 2017). Additionally, the growing market demand creates harvesting pressure especially for the commercially recognized plants, which on the other side represents threat for endangering the specific plant species.

Table 1. Quantities and values of exported wild fruits from North Macedonia (2014-2018)

Wild fruit	Measure	2014	2015	2016	2017	2018
	Tonnes	133	68	158	235	260
<b>Mosses and lichens</b>	Euro	72,000	75,000	87,000	95,000	260,000
	Tonnes	137	147	171	228	351
<b>Fungi</b>	Euro	607,000	746,000	578,000	703,000	1,152,000
	Tonnes	208	160	216	333	134
<b>Juniper</b>	Euro	177,000	193,000	472,000	553,000	269,000
	Tonnes	216	192	386	183	162
<b>MAP*</b>	Euro	947,000	956,000	2,024,000	955,000	1,130,000

Note: MAP-Medicinal and Aromatic Plants; Source: UNCTAD database, 2018

In absence of accurate data of registered collectors, an additional source of information may be found in the issued export licenses. This information provides some estimates for the structure of export companies and the quantities they marketed abroad. In order to make a full assessment, the quantities of resources collected in North Macedonia, mainly for domestic use, should also be estimated. With the revival of the collection and redemption permit system introduced by the Public Enterprise for Forest Management, in the future there should be a possibility to gain more accurate insights into the quantities of collected medicinal and aromatic plants (MAP) and fungi (MAFWE, 2013).

The forests in North Macedonia are characterized with great biodiversity, ecologically clean regions, which is also a prerequisite for organic certification of plants, mushrooms and forest fruits collected in these regions.

The different types of externalities can be valued through different economic valuation techniques. In order to apply the TEV approach to the wild fruits in North Macedonia, we adapted the valuation technique from Merlo and Croitoru (2005) and Öztürk *et al.* (2009) for classification of the economic values for forests, and have applied it on this specific segment in the country (Table 2). In this context, the positive externalities are more apparent and seen through their direct and indirect benefits for the collectors and the end users. In this paper the focus is mostly on the direct use which could be valued through the rent capture technique, quantifying the collected fruits on one side and governmental income through the collectors and buy-out companies' fees. Thus, the direct use value also indicates the contribution of this sector towards the overall economy of the country. The rest types of positive externalities are more intangible and their benefits cannot be directly seen. They can be recognized through maintaining of the biodiversity conservation, human health as well as contribution to the improved pharmaceuticals based on natural grown ingredients. The indirect, option and the existence values can be measured through determination of the shadow price, utilizing cost based approach and rent capture.

Most of the negative externalities are related to the other factors that influence forest biodiversity. The primary negative externality refers to the changes in production function, restoration and replacement costs for wild plants caused by erosion, floods, landslides and forest fires. The improper collection of plants, as well as over collection of certain plants are considered as a human factor influencing the species extinction as major negative externality.

Table 2. Positive and negative externalities in wild fruit evaluation

Externality-Value type	Outputs	Valuation techniques	Physical indicators	Monetary indicators used	
<b>Positive externality</b>	Direct use value	Collection of wild fruits	Rent capture	Quantities of wild fruits collected	<b>Market price of wild fruits</b> (for collectors and buyout centres)
		Grazing	Rent capture	Taxation	<b>Collectors' fee</b> (For government)
	Indirect value		Substitute goods	Quantity of forage grazed	<b>Price of hay</b>
		Healthy diet	Shadow price	Human health	<b>Lowered health expenditures</b> (For government)
		Bequest-Existence value	Biodiversity conservation	Cost-based approach	Protected area (ha)
Option value	Pharmaceuticals	Rent capture	Plant species (number)	<b>Market price</b> for pharmaceuticals	
<b>Negative externality</b>	Erosion, floods and landslides	Changes in production function and replacement costs	Change in production function (quantitative valuation) and replacement cost (monetary valuation)	Loss of soil nutrients	<b>Cost of fertilizers</b>
	Damage caused by forest fires	Restoration costs (value of damage)		Area burnt by fires (ha)	<b>Cost of restoration</b> /or value of wild fruit species.
	Overuse	Species extinction		Loss of soil nutrients, possible erosion.	
	Pests	Species extinction Change in production function	Change in production function (quantity and quality), use of pesticides.	Exclusion of the area from the list of potential for collecting organic wild fruits	<b>Cost of chemical treatment/ Loss of economic gain</b> of organic production

Source: Adapted from Merlo and Croitoru (2005) and Öztürk *et al.*, 2009

Wild plants in North Macedonia have wide spectrum of use in the food industry. These products are marketed not only on the domestic, but also on foreign markets (especially in EU), with a distinct quality and organic certification. The firms in these markets have free market entry in terms of collecting, buying and processing of wild fruits. However, on one hand, the natural potentials in the country are still underutilized, but on the other hand, there is a potential for devastation of forests and forest funds, primarily due to unregistered buyers and shortage of trained collectors of wild fruits. This situation is affecting buyout prices and quantities and is also distorting the real picture of the on-field conditions, quantities of collected wild fruits and their quality. Additionally, it demotivates the registered firms and collectors, which invest in their certification (organic), which is one of the possible reasons that the number of registered collectors and firms is constantly decreasing (MAFWE, 2013). This is a potential threat for this industry and a problem for the potential positive externality and their “Direct use value” and especially for the government and the lowering of the licensing fee. A possible solution would be if the government assign and define quotas for wild species collection as well as specify in the tariff codes for the species exported for better track of the collected and exported wild fruits. This would be in connection to the principle of "user pays", an economic principle, covered by the Law on Environment (OG, 2005), which would ultimately increase the level of

compensation and provide feedback from the Customs Administration and exporting companies regarding the realized export quantities (MAFWE, 2013).

## CONCLUSIONS

The assessment of economic values for wild fruit externalities is not incorporated in the markets in North Macedonia, although they play an important role in the formulation of successful policy and determination of the real contributions of these resources to the sustainable development. At the same time, this potential is threatened by inadequate collection practices, low quality management, and unfair distribution of value along the chain. Additionally, the unregistered (illegal) utilizations, wrong applications in the wild fruit management and forest fires are considered as most important negative externalities. North Macedonia could better reallocate collected budget funds (collected through the export tax), which on the other side is seen as one of the main positive externalities.

In order to establish a sustainable management with the local biodiversity, an introduction of transferable quotas is necessary, based on inventorization of wild plants capacities by determining their locations and the possibilities for collection. Additionally, establishing a sustainable way for natural resources use is possible through organic certification.

Therefore, in order to create an efficient system for management and protection of these resources, it is necessary to further identify and specify the different economic evaluation and related externalities. Studies concerning externalities confirm that these values which are usually not incorporated in the market values, play an important role in formulating successful forest and wild plant policies, hence the urgent need for considering these non-market externalities in order to pursue sustainable management strategies. In this context this research provides the theoretical framework and is considered as a starting point for the further analysis of the wild plants externalities effects in North Macedonia.

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