

# ECOSYSTEM SERVICES PROVIDED BY WILD PLANTS AS A BASIS FOR SUSTAINABLE LIVELIHOOD



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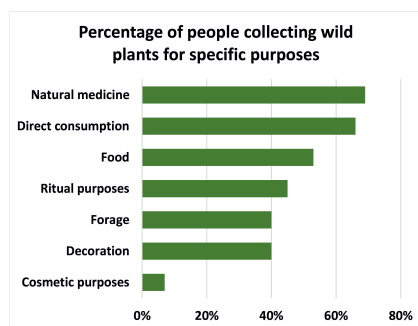
## INTRODUCTION

Wild plants and animal products are one of the provisioning ES according to MA (2005). In CICES classification (Haines-Young, Potschin, 2018) collecting wild plants may refer to a few provisioning ES, i.e., wild plants used for nutrition (1), fibres and other materials from wild plants for direct use or processing (2), wild plants used as a source of energy (3), genetic material from plants (4). Furthermore, collecting wild plants provide a wide range of cultural ES (Poe et al., 2013). In rural areas, ES provided by wild plants may serve not only for satisfying one's own needs but also as a basis for livelihood (e.g., Poe et al., 2013). Here, the main focus is put on the ES provided by semi-natural habitats. On the one hand, species of these communities may provide people with food, forage and biofuel as well as pose a foundation for the pastoral economy. On the other hand, herbal medicines, cosmetic, decoration and ritual purposes made from wild plants may be sold (Hönlíková et al., 2012). Apart from that, ES provided by wild plants may foster the development of eco-tourism, e.g., the traditional cuisine based on wild plants may serve as a tourism product (Luczaj et al., 2012). At the same time, as a result of socio-economic transformations leading to land abandonment and reforestation processes, mountain grasslands and other semi-natural communities belong to the most endangered ecosystems in Europe (Tokarczyk, 2018). The decrease in area of open spaces effects in the lower level of provided ES (Bieling 2013). Hence, the conservation of grasslands may be fruitful for sustainable livelihood including both gathering wild plants for provisioning purposes but also for eco-tourism development. In the light of the above, the aim of the study was to investigate how local people benefit from collecting wild plants from semi-natural habitats and, consequently, what are the possibilities for combining sustainable livelihood with semi-natural habitats conservation in mountain areas.

## RESULTS

### ECOSYSTEM SERVICES PROVIDED BY COLLECTING WILD PLANTS FROM SEMI-NATURAL HABITATS

89% declared that they collected wild plants from semi-natural habitats



### Plants from semi-natural habitats utilized by local residents

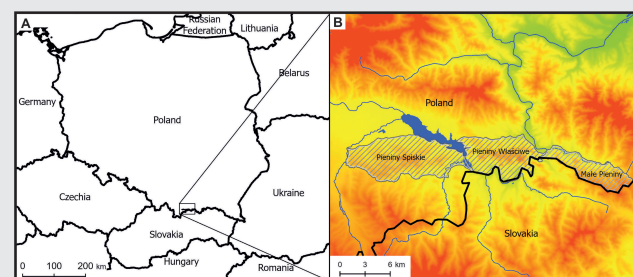
Species	Natural medicine	Food	Direct consumption	Cosmetics	Rituals	Decoration	Forage
blackberry <i>Rubus sp.</i>		3		9			
blackthorn <i>Prunus spinosa</i>	8	2		2			
blueberry <i>Vaccinium sp.</i>	6	15		25			
camomile <i>Matricaria chamomilla</i>	2	1			1	2	1
clover <i>Trifolium sp.</i>			1			1	
coltsfoot <i>Tussilago farfara</i>	1						
comfrey <i>Symphytum officinale</i>	1						
common centaurium <i>Centaurium erythraea</i>	3			1		1	
common daisy <i>Bellis perennis</i>					1	2	2
common dandelion <i>Taraxacum officinale</i>	12				1	1	
common nettle <i>Urtica dioica</i>	14	1			2		2
common thyme <i>Thymus vulgaris</i>	1				1		
field horsetail <i>Equisetum arvense</i>	2					1	
hawthorn <i>Crataegus sp.</i>	7	1		1			
horseradish <i>Armoracia rusticana</i>		1					
juniper <i>Juniperus</i>	1						
mint <i>Mentha sp.</i>	12	1				4	
orchid <i>Orchidaceae</i>							1
raspberry <i>Rubus sp.</i>	6	9		22			
ribwort plantain <i>Plantago lanceolata</i>	4						
St. John's wort <i>Hypericum perforatum</i>	20						
sorrel <i>Rumex sp.</i>		5		6			
tansy <i>Tanacetum vulgare</i>	1					1	2
tortemil <i>Potentilla erecta</i>	1						
wild rose <i>Rosa sp.</i>	3						
wild strawberry <i>Fragaria sp.</i>		9		35	1		
violet <i>Viola sp.</i>							1
yarrow <i>Achillea millefolium</i>	3					1	
	very rare	rare			popular		very popular

The numbers represent the number of people who declared using specific species.

## METHODS

In order to obtain information on ES provided by wild plants found in semi-natural habitats, a survey among inhabitants of the Pieniny Mountains was conducted. The information on collecting plants for different ES was gathered. Applying CICES (Haines-Young, Potschin, 2018) classification as a starting point for the selection of ES provided by wild plants from semi-natural habitats, 9 categories of provisioning ES were distinguished. They included: direct consumption (1) and food (2), fibres and other materials from wild plants for direct use or processing into natural medicines (3), cosmetics (4), decoration (5), ritual purposes (6), fertilizers (7) and forage (8), wild plants used as a source of energy into biofuels (9). A random sampling method was used. Addresses were drawn with the application of GIS tools from all addresses of residential buildings within the Pieniny Mountains. Address database was derived from Statistical Office and residential buildings were selected based on the National Database of Topographic Objects for Poland. In the case of the refusal of first choice residents, an interviewer asked at the next-door household. A total of 85 questionnaires were collected from September 2019 to February 2020. The response rate was 50%.

## STUDY AREA



A – location in Central Europe; B – division

Land use in the Polish part of the Pieniny Mountains (based on National Database of Topographic Objects for Poland, 2013)

Land use	Mate Pieniny [%]	Pieniny Właściwe [%]	Pieniny Spiskie [%]	Pieniny Mountains in general [%]
forest	55	57	35	46
semi-natural vegetation	29	21	39	31
arable land	11	17	21	17
built-up area	4	3	3	3
water bodies	1	3	1	2

=> for direct consumption, food, natural medicine, cosmetic purposes specific species have crucial meaning  
=> for decoration, ritual purposes or forage – mainly specific parts or types of plants, i.e., flowers, herbs or grass are desirable regardless specific species

=> Around 38% of respondent's households used ecosystem services from grasslands for livelihood.  
=> The sale of collected herbs and fruit concerned only 4% of households.  
=> One in three households was involved in livestock grazing and feeding it with hay (33%).  
=> Other types of livelihood concerned individuals – sale of preserves from collected plants, sale of decoration pieces as well as selling some animal products (dairy, honey, etc.) obtained indirectly from grasslands.

## DISCUSSION

In order to make the utilization of wild plants more profitable and combine it with grasslands conservation, the effort should be put to promote engagement in activities more adapted to the current economic situation (e.g., eco-tourism, selling of processed wild plants products). According to Chan et al. (2011), cultural ES are currently one of the main reasons for ecosystems conservation. As it results from the study of Fontana et al. (2014) traditionally managed meadows provide to the largest extent ES based on edible and healing plants as well as aesthetics. Thus, a good solution for sustainable livelihood may be combination of eco-tourism with extensive livestock grazing. It would enable the production based on processed milk which yields a much more attractive profit, serving also as tourism product, than milk production, which was mentioned by some of interviewed residents as unprofitable and served as a main reason of livestock grazing abandonment.

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