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ORIGINAL PAPER

Forest land tax reductions – an effective payment for forest ecosystem services in Slovakia?

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Abstract
Preferential land tax programs are used over 50 years and are mainly connected with nature protection and environmental goals. Nowadays, they are also considered as a way how to promote and support forest ecosystem services that arise from exempted forest land. In Slovak Republic national forest land tax reduction scheme exists for special purpose and protection forests, as well for other forests with special importance. The goal of the paper was to develop a multidimensional evaluation of this economic instrument for ecosystem service support in Slovakia. We evaluated how the forest land tax reduction fits into the payments for ecosystem services theory, which services are supported and what is the potential and implementation effectiveness according to theory of policy analysis. Even though, the forest owners and enterprises benefit from tax reductions, evidence regarding its visibility as payment for ecosystem service is low. Forest land tax reductions are considered as other economic incentive for ecosystem services support with moderate potential effectiveness. Despite the instrument have low visibility of FES supported from both sides – sellers and beneficiaries, its potential effectiveness is high, due its automatic and stable implementation without relevant implementation gaps.
Key words: forest functions; preferential tax programs; economic instruments; program goals; evaluation analysis

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1. Introduction

Forest ecosystem services include benefits beyond wood production (de Groot et al. 2010). In spite this fact, the government bodies often express an interest in supporting ecosystem services through a wide range of public policy instruments (Kilgore et al. 2017). The public policy instruments according to the degree of authoritative force involved are classified as regulatory, economic, and informative ones (Krott 2005; Vedung 1998). Economic policy instruments influence the forest owner´s behaviour by financial stimuli (Krott 2005) and are considered as market-based incentives for supporting forest ecosystem services (Pirard 2012). Economic instruments have received widespread attention over the last three decades and are implemented with the purpose of adapting individual decisions to collectively agreed environmental goals (Lago et al. 2015). Land tax incentives include reliefs and reductions for individuals, items or transactions that would otherwise be taxed (OECD, 2014) and in forestry are mostly linked to specific forest management practices (Ma et al. 2014), nature protection (Hibbard et al. 2001; Kilgore et al. 2017; IUCN 2009) and land under the payments for ecosystem schemes (Barton et al. 2017). On the opposite, also tax programs exist, that are implemented as added land tax or sanction to protect forests from being converted to other uses (Hibbard et al. 2001; Kilgore et al. 2007; Šálka et al. 2017). Land tax incentives are politically feasible because of their less demanding implementation, meaning that no direct expenditure is required, the administration is easier, and no additional action is required (Weimer & Vining 2011; Kilgore et al. 2018).

The majority of Slovak forests are production forests (72.6%). The second most common are protection forests (17.3%) in which ecological functions are of prime importance. Lastly, there are special-purpose forests (10.1%) in which social and cultural functions prevail (Ministry of Agriculture and Rural Development, 2020; FAO 2020).

The forest land tax incentives used in Slovakia are tax reductions for forest owners of protection and special purpose forests (Sarvašová et al. 2019; Giertliova et al. 2019). Special purpose forests and protection forests are managed primarily for non-productive forest functions (Konôpka & Konôpka 2003). These are source of many

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benefits, referred as ecosystem services, that are crucial for human welfare (MEA 2005). Slovak system of land tax reduction could be described as public-non voluntary payment for ecosystem services (PES) scheme, that supports forest ecosystem services arising from specific forest categories (Sarvašová et al. 2019, Table 1).

Studies about empirical evaluation of policy instruments highlighted the need for policy to be grounded on firm understanding of *whether*, under *what conditions* and *how* policy instruments are implemented (Miteva et al. 2012). Moreover, comprehensive information about forest land property tax programs and the ecosystem services they support is often not complete or fully understood (Kilgore et al. 2018). We adapted this approach to the land tax reduction performance evaluation with the aim to describe what has been working and what hasn´t in the implementation of this instrument in Slovakia and how effective it is related to ecosystem services support.

Table 1. Non-productive forest functions and their ecosystem services.

Forest function (Act on Forests o. 362/2005 Coll)	Forest categorisation	Subcategories of forests	Functional typization (Dezoro & Schwartz 2001) Primary function	Ecosystem service category (MEA 2005)	
Ecological function	Protection forests	Forests in extremely unfavourable habitats, alpine forests below the upper limit of tree vegetation, forests with a predominance of rhododendrons, other forests with a predominant function of soil protection	Anti-erosion Hydric accumulation Anti-erosion Riparian protective Accumulation Hydric	Regulating	Supporting
Societal function	Special purpose forests	Forests in protection zones of water resources	Water protective	Regulating	Supporting
		Spa forests	Spa-treatment		
		Anti-emission	Anti-emission		
		Forests in protected areas and areas with protected spieces (f.e. NATURA 2000 areas)	Nature protective		
		Forests in recognized game tanks and individual pheasants	Hunting	Cultural	
		Recreational forests	Recreational		
		Forests for forestry research and teaching	Educational		
		f.e Military forests, forests in established gene bases of forest trees	Other societal		

Source: Báliková 2020.

2. Material and methods

The aim of the study was to conduct an evaluation analysis of forest land tax reduction in Slovakia. As a basis for the evaluation of its effectiveness, we chose a range of criteria from PES, policy analysis and governance theories, with the aim to compare the policy output goals (formulation phase) and achieved goals (implementation phase).

2.1. Evaluation criterions

In this paper, policy evaluation is seen as "the application of systematic research methods to the assessment of program design, implementation and effectiveness" (Chelimsky 1985:7 in Vedung 2017). Effectiveness is the extent to which a program achieves its goals or are expected to be achieved considering their relative importance (OECD DAC 2010). Proposed evaluation method monitors the effectiveness of the instruments related to three dimensions: PES schemes, potential effectiveness, and implementation effectiveness (Table 2).

2.2. Methods

The study was methodologically based on qualitative social methods, namely: document analysis, case studies and interviews with relevant actors. The document analysis was focused on national legislation and annual reports on Land Tax in Slovakia, particularly:

- Act. on local taxes and local fees for municipal waste and small buildings no 582/2004 Coll.
- Database on property taxes for years 2013–2017.
- Legally binding regulations of chosen municipalities.
- Databases o National Forest Inventory (area of forest categories).

The case study method was used for the analysis of the implementation process of land tax reduction (Table 3). More than 20 case studies in chosen municipalities focused on implementation of forest land tax were carried out within a national granted project no. APVV-15-0715. From these case studies, municipalities were chosen where forest land tax exemption was mentioned. The methodology of the case studies was as follows:

1. Analysis of local legislation (binding acts of municipalities).
2. Structured interviews with municipality and forest enterprise representatives.
3. Analysis of the obtained data.
4. Summary of results.

Standardized interviews alongside the case studies (Table 4) were used to verify and supplement the information concerning the implementation process of land tax reduction. The respondents in case studies represented actors from the forestry and public policy and were chosen according to their active performance and power in the field and upon expert estimation. We set up few open-ended questions that address the problem:

1. In your opinion, what is the "visibility" of support for ecosystem services in the form of tax reduction for beneficiaries of these ecosystem services (e.g., inhabitants of Slovakia; environmental organizations, etc.)?

2. In your opinion, what is the "visibility" of forest land tax exemption for forest owners and enterprises?
3. How would you describe the policy arena of land tax reduction?
4. How would you describe the information asymmetry of land tax reduction?
5. Are there implementation shortcomings in the implementation process of land tax reduction?

3. Results

3.1. Forest land tax reduction as PES scheme?

Forest land tax reduction are part of the national preferential land tax program with the aim to support forest owners or enterprises, who own protection or special purpose forests. Forest land tax is paid for production forests. Special purpose forests, protection forests, and parts of production forests with special importance are

Table 2. Used sets of evaluation criteria.

Dimension	Criterion	Evaluation	Reference
PES	Supported FES	The schemes support either one or two precisely specified FES that can be isolated and valued, or the payment is aimed at supporting global FES flowing from a well-defined land.	MEA 2005; De Groot et al. 2010; Čaboun et al. 2010
	Packaging of FES	FES can be supported in various packages through the Bundling, Layering or Piggy backing principle.	Smith et al. 2013
	Voluntariness	Descriptions of the degree of voluntariness of the forest owner's commitment as low, moderate, or high.	Engel et al. 2008
	Financing	Public, private, mixed.	Mavsar et al. 2008; Matzdorf et al. 2013
	Visibility for sellers Visibility for beneficiaries	The level of visibility, that is, the costs and benefits of the policy are easily detected by both the providers and beneficiaries.	Kemkes et al. 2010
	Valuation method	From the seller, buyer or both perspectives.	Štěrbová et al. 2020; De Groot et al. 2010
	Additionality	Presence of direct changes in forest management practices caused by PES implementation.	Reed et al. 2017
	PES type	According to the five PES criteria (Wunder, 2005), the PES schemes can be classified as PES core schemes (only schemes that strictly follow the five main criteria), PES-like schemes (incentives comply with only some of the five requirements), Other economic incentives (a range of economic incentives as PES, where payments are made to achieve higher levels of ES streams in different contexts).	Zendersen et al. 2009; Wunder 2005
Formulation (policy output)	Effect	Distributive policy gives each group in society what it demands, without putting another group at a disadvantage. Redistributive measures - are based on a visible and tangible redistribution of funds, rights or other values between layers and groups in society. Redistributive measures visibly have "winners and losers".	Šálka et al. 2017; Krott 2005; Windhoff-Heritier 1987
	Regulative component	Conditions for obtaining financial support, which may be low, moderate or high from the point of view of the recipients.	
	Motivational component	Incentives for beneficiaries to change their behaviour in order to receive financial support. This motivation can be low, moderate, or high from the recipient's point of view.	
	Administration difficulty	The complexity of the process from applying for financial support to approving it. Beneficiaries may perceive this process as complex, neutral, or simple. It depends mainly on informatization of this process, complexity and number of forms, certificates, etc.	
	Accompanying consultation activities	Accompanying counselling activities aimed at raising awareness of the possibility of drawing support are or are not available.	
	Clearly defined goals	A clearly defined goal of the instruments facilitates its evaluation. It can be determined in linguistic expression (qualitatively), quantitatively (forest area, number of applications submitted) or by FES indicators.	
	Link to the other policy instruments (policy mix)	The effectiveness of the instruments is increased through other instruments. In this case, they can be linked to one, two or three other instruments in policy mix.	
	Potential effectiveness	Evaluation of potential effectiveness based on instrument parameters as described in policy output.	
Implementation	Policy arena	Relationships of actors involved in the implementation of the measure. They can be consensual, neutral, or conflicting.	Šálka et al. 2017; Krott 2005; Windhoff-Heritier 1988
	Evaluation methods	Evaluation of instrument effectiveness is or is not present. If present, it may be a passive evaluation through annual or informative reports or an active evaluation through an evaluation of the whole implementation process, including the involvement of the various stakeholders.	
	The level of fulfilled goals	The control of the fulfilment of policy goals can be performed in two ways - qualitatively based on the opinions of the formulators of the instrument or quantitatively, by means of "numerical" statements (e.g., supported area, number of contracts, number of applications).	
	Implementation shortcomings	Occurrence of relevant or irrelevant facts and gaps affecting the implementation process of the instruments.	
	Policy impacts	Evaluation of policy impacts, describes short-term changes in behaviour, information, attitudes, or knowledge of target recipients.	
	Informative asymmetry	Evaluation of the quality and quantity of information available in the implementation phase between the provider of financial support and the addressee. It can be high (the addressee does not have enough information on the status of his application and payments made, the provider cannot check the effect of the measure or program even on his own and does not have access to cross-sectoral information needed to evaluate the effect of the measure or program), medium (information is missing from the addressee or program). provider) or low.	
	Implementation effectiveness	The overall implementation effectiveness can be evaluated as low, moderate, or high.	

Table 3. Case studies on Land tax reduction implementation concerning the main type of reduction.

Case study	Municipality	Objective of the study	Reduction Obligatory / Facultative*	Impact	Policy arena
CS 1	Štiavnik	a) land with cemeteries, columbarium, urn groves and scattering meadows.	F	yes	Consensual
		b) clear-cut forests till year of first thinning	F	no	
CS 2	Petrovice	a) land with cemeteries, columbarium, urn groves and scattering meadows.	F	yes	Neutral
		b) clear-cut forests till year of first thinning	F	no	
CS 3	Polomka	b) land with cemeteries, columbarium, urn groves and scattering meadows.	F	yes	Consensual
CS 4	Bacúch	b) land with cemeteries, columbarium, urn groves and scattering meadows.	F	yes	Neutral
CS 5	Lučenec	a) land with cemeteries, columbarium, urn groves and scattering meadows.	F	yes	Consensual
		b) swamps, areas of bogs and salt marshes, peat bogs, draws, groves, windbreaks, and zones of hygienic protection of water resources I. degree and II. degree, zones of protection of natural medicinal resources I. degree and II. degree and sources of natural mineral waters of table I. degree and II. degree,			
		e) lands of publicly accessible parks, premises, and sports grounds	F	yes	
CS 6	Zvolenská Slatina	b) clear-cut forests till year of first thinning	F	no	Conflict to neutral
CS 7	Ihráč	b) clear-cut forests till year of first thinning	F	no	Consensual
		Exemption for special purpose and protection forests, relief for forests in National Parks	O	yes	Consensual
CS–SK	National	Forests in national parks, protected landscape areas, protected areas, nature reserves, national nature reserves, natural monuments, national natural monuments, protected landscape features, in declared protection zones with third and fourth degree of protection and areas of international importance.	O	yes	Consensual

*The land tax reduction options vary according to legislation on facultative and obligatory ones. Municipalities can decide on the possibility of providing facultative reduction. Obligatory reduction is mandatory by law and must be implemented by the municipality. Specific options of these reductions concerning the forest categories are described in the following sections.

Table 4. Identification of respondents involved in the study.

Policy analysis	Organisation	Position	ID
Recipients	ÚNIA (forest owners association)	Deputy director	R1
	VŠLP (University Forest Enterprise)	Director	R2
Formulators (national level)	Ministry of agriculture and rural development, Forest policy and economy section	Head of the section	F1
State forest administration – Regional forest office		Director	I1

exempted from the tax. Due to its national character, it is focused on the support of well-defined forest categories, thus global ecosystem services. Looking at the local level (place-based approach), a specific service is supported, which stems from the primary function of the forest. The forest management of protective and special purpose forests is adapted to its primary functions and the resulting ecosystem service (s) and other are enhanced as "free-ride", which means the support of FES in the form of Piggy Backing principle (Table 2, Packaging of PES).

In spite the fact, that the forest land tax reduction is not a direct payment, the visibility of this payment scheme for the forest owner/enterprise (potential seller) is lower than in the case of private PES schemes. The forest owner considers tax reduction to be an economically visible, but seldom associates it with the provision of additional forest ecosystem services. The visibility of FES support via tax reduction from the beneficiaries' point of view in Slovakia is low, almost non-existent. The public does not associate this instrument with the support of forest ecosystem services at all. This was agreed by interviewed actors (R1, F1, I1).

The tariff of forest land tax reduction is equal to the amount of forest land tax, which is a valuation from the perspective of the buyer (municipality), that determines the value of the land. If the forest owner/enterprise decides to optimize the forest land tax and thus the reduction, he can have an expert opinion drawn up at his own request. This method can be considered as a valuation from the perspective of the seller. We consider preferential forest land tax program in Slovakia as public other economic incentive for supporting forest ecosystem services, thus their effectiveness related to FES is lower than in private PES-like or PES core schemes.

3.2. Potential effectiveness of land tax reduction

Forest land tax reductions are divided into two categories: obligatory and facultative ones. Obligatory reductions from land tax refer to special purpose forests, protection forests and forests in National parks and reservations. Facultative land tax reduction refer to:

– swamps, areas of bogs and salt marshes, peat bogs, draws, groves, windbreaks, and zones of hygienic protection of water resources I. degree and II. degree, zones of protection of natural medicinal resources I. degree and II. degree and sources of natural mineral waters of table I. degree and II. degree, lands of public parks and sports grounds,

– clear-cut forests till year of first thinning,
– lands of publicly accessible parks, premises, and sports grounds,
– forest land located in water sanitation zones II. and III. degree, protection and creation of the environment, their impact on ecological disasters, excessive air pollution, riparian vegetation and other areas of tree and shrub vegetation on non-forest land with soil protection, ecological and landscaping function - support for services of all marked categories.

The policy output at the national level is the Act on Local taxes no. 582/2004 Coll. and governs obligatory land tax reduction and conditions for facultative land tax reductions that could be applied at local level. Facultative land tax reduction are regulated by Binding regulatory act that refers to policy output on local level (Fig. 1).

In terms of nominal categories of public policy instruments, we consider forest land tax reduction as the instrument of communal policy and in terms of institutional boundaries we include it into forest, agriculture, and nature protection policy. According to policy analysis theory, tax reduction are instruments with material performance (Šálka et al. 2017). The predominant effect of the forest land reduction is redistributive (Dobšinská et al. 2019). Furthermore, the stakeholders agreed that the land tax reduction redistribute costs and benefits between groups of forest owners and municipalities (R1, R2, F1). Forest owners consider land tax reduction as an increase of their profit (R1, R2) whilst, on the other hand, for municipalities are land tax reduction considered as reduced expected income (F1, CS 1, CS 2, CS–SK). The program goal of the land tax reduction is settled every year in qualitative terms as total area of special purpose and protection forests and land considered as subject for facultative options of land tax reduction.

Forest land tax reduction have strong regulative component in the form of legal restrictions that arise from relevant legislative acts and forests are exempted only in case that differential management practices are applied. The evaluation of the motivational component depends on the character of land tax reduction, we estimate it as moderate (R2, F1, CS–SK):

a) Strong motivational component in case of obligatory tax reduction, in case of reclassification of production forests to special purpose forests, which are still production effective.
b) Weak motivational component in case of reclassification of protection forests. Lan tax reduction is low financial support and forest owners are not perceiving it as strong stimuli to change categories of production forests on protection forests (R1).
c) Weak in case of facultative land tax reduction for clear-cut forests (CS1, CS2, CS6, CS7).
d) Strong in case of other facultative land tax reduction options such as exemption for national parks, swamp lakes and water sanitation zones (CS1, CS2, CS3, CS4, CS5).

Mentioned legislation governs the process of land tax exemption admission and what forest owners must provide: i) to submit a valid forest management plan to the municipality (local tax administrator) and ii) to submit a tax return by 31st. January of the current year with a completed appendix "Application for Property tax reductions". Based on the case studies and interviews with respondents, we evaluated the administration difficulty as low. The main advantages are simple documentation, local level of implementation and automatic granting of exemption in the case of clearly defined conditions governed by legislation (R1, R2, CS–SK). This process is considered as undemanding, even when the specific

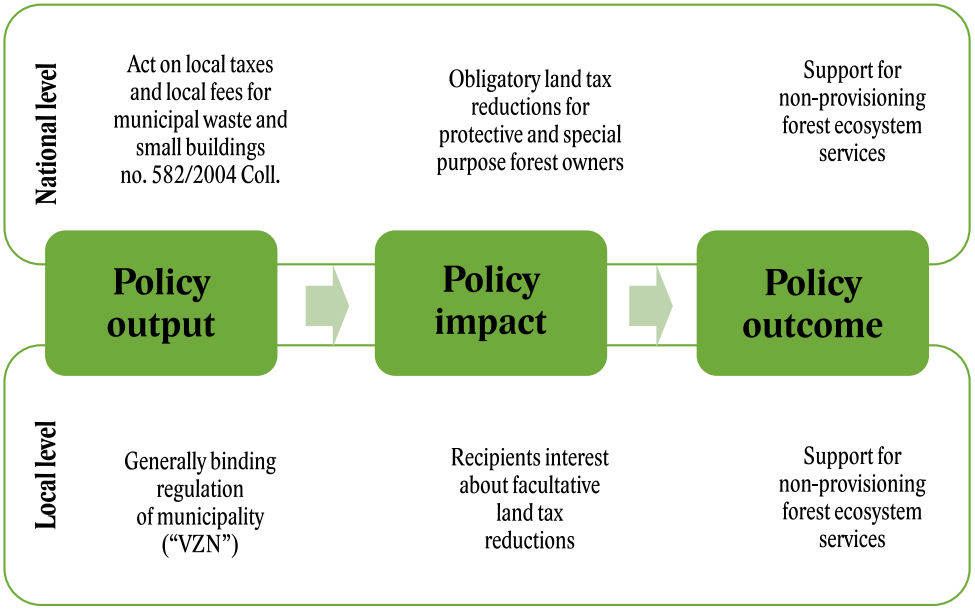


Fig. 1. Policy cycle of the Land tax reduction.

accompanying advisory activities are lacking (F1, R1, R2). The potential effectiveness of forest land tax reduction is enhanced through a combination of information and regulatory instruments that interlink to each other implementation process (Table 5).

Table 5. Linkage of forest land tax reduction to the other forest policy instruments.

	Regulation instruments		Information instruments
Land tax reduction	Differential forest management practices enforced in special purpose and protection forests	Declaration process of protection and special purpose forests	Forest management plan

3.3. Implementation effectiveness of land tax reduction

The implementation process takes place in a policy network, that consists of institutions, groups and individuals who are in formal and informal relationships (Windhoff-Heritier 1976). The following types of actors are involved in the implementation of the land tax reduction:

- The "formulators"– municipality major, municipal council, inhabitants, forest owners and enterprises.
- The "implementators" – municipality as local land tax administrator.
- Recipients – state and non-state forest owners, forest enterprises.
- Actors affected by the land tax reduction – forest owners and forest enterprises (positively affected group), municipality (negatively affected group) and local community as the beneficiary of regulating and cultural ecosystem services arising from protection and special purpose forests (positively affected group).

Based on the analyses of single case studies and interviews with stakeholders, the policy arena between mentioned group of actors is in most cases neutral (CS2, CS4) to consensual (CS1, CS3, CS5, CS7, R1, R2, F1). This is mainly due to the fact, that if the municipality has a dissenting opinion on the amendment to the relevant legislation, it addresses it to the formulators at national level, thus eliminating conflict between the municipality and forest owners at local level, that are mostly in informal relations and know each other (R1, R2). The complaints of municipalities are represented at the national level through the Associations of towns and municipalities of Slovakia (R1, F1, I1). The requirements of forest owners at national level are represented by forest owners' associations (Šálka et al. 2016). In the case of facultative land tax reduction, the forest owners and municipalities have a wider space of negotiation and participation of abonnement of General binding rules, so conflicts are less intense, and relations are neutral to consensual (R1, R2).

Although policy evaluation is not mandatory and is not prescribed by the law, it is carried out on an ongoing basis. The implementation process of the land tax reduction was evaluated within the applied research national Evaluation Study. The aim of the evaluation was to conduct implementation analyses of selected forest policy instruments for ensuring ecosystem services. The final evaluation reports were addressed to formulators of the instrument at national level (Dobšinská et al. 2019). Passive ongoing evaluation via *Municipal taxation reports* on local level is made annually (B1, CS1–CS7). The formulation goals are fulfilled every year for obligatory land tax reduction, facultative are fulfilled partly (F1). The database about property taxes for years 2013-2016 helped to calculate obligatory land tax reduction per each year in monetary terms, what is considered as financial support for non-provision forest ecosystem services (F1, CS–SK). Moreover, it provided the amount of facultative land tax reduction for forest owners (Table 6). The goals of land tax reduction are fulfilled every year (Data centrum, R1, CS–SK, F1, I1). The targets for forest land tax reduction are met, as evidenced by an average of almost 4.5 million EUR, which forest owners save each year through the payment scheme (Table 6).

According to the case studies and interviews with actors, few implementation shortcomings appeared during the implementation process but, they are not perceived as significant (R1, R2, F1, CS–SK), thus, it is not surprising that forest owners are not complaining about the implementation process of reduction (R1, F1). We found out a partial change in the behaviour of the recipients (policy impact):

- Behaviour change appeared in the case of obligatory land tax reduction, given that there were few cases when forest owners have recategorized production forests into special purpose forests, that still have production potential (R2, F1).
- The change in behaviour did not appear in one case of facultative forest land tax reduction options, where forest owners do not use the opportunity to apply for land tax reduction in case of clear-cut forests (CS1, CS2, CS6, CS7).

The rate of the information asymmetry has been evaluated as moderate. Information asymmetry occurs on the side of the „buyer" represented by the municipality. The municipality as a local tax administrator often does not have sufficient information about current changes in

Table 6. Estimated amount of forest land tax reductions in euros per year.

Year	Protected forest area [hectares]	Special purpose forest area [hectares]	Total	Average land tax euros per hectare	Obligatory land tax exemption euros per year
2013	332 501.00	226 216.00	558 717.00	8.49	4 745 706.56
2014	333 409.00	219 079.00	552 488.00	7.81	4 317 200.23
2015	334 541.00	210 665.00	545 206.00	7.50	4 088 105.64
2016	335 187.00	2045 52.00	539 739.00	7.92	4 273 586.99

Source: Database on Property taxes, Datacentrum 2017.

legislation (I1,1F1). Moreover, in the evaluation report of Ministry of Agriculture (2018) is declared, that information asymmetry exists mainly in connection with the application of procedures from the forest management programs (FMP). The FMP serves as a basic document for the calculation of the forest land tax as well as reductios. Forestry information reported in the FMP is complex and professionally demanding for the tax administrators, and they cannot judge whether the owner or manager uses differential management practices and thus are not evaluating the effects of the land tax reductios 1F1, I1). On the other hand, information asymmetry on the side of the seller is low. Forest owners have sufficient information on the exempted payment and value of forest land, given the need to have expert report on forest land, moreover they have information from local administrator, most of whom they know in personal 1R1, I1, CS1, CS4).

3.4. Main findings and recommendations

As the evaluation analysis revealed, the forest land tax reductios have "moderate" implementation effectiveness. Contrary, the potential effectiveness is considered as "high" (Table 7).

According to the evaluation criteria, we could describe the forest land tax reduction as other economic incentive with moderate potential effectiveness, but high implementation effectiveness. The implementation effectiveness is related more to the policy evaluation than PES schemes evaluation.

The land tax reduction meet the goals in the case of obligatory land tax reduction options. Forest owners do not apply for facultative ones. Based on the evaluation of the policy output, the instrument has "moderate" potential effectiveness. Changes in recipient's behaviour (policy impact) in the case of obligatory and most of facultative land tax reduction were confirmed by our research. In the case of clear-cut forests, forest owners do not apply for facultative land tax reduction even though the management of clear-cut brings costs without earnings till year of first thinning (Repáč et al. 2017). Forest owners consider the forest land tax reduction necessary and its economic benefits for their profit as high. The levying of taxes on forest land with commercial forests has also been questioned, as production forests also provide benefits to the general population in a wide range of forest ecosystem services, including through free entry into the forest, and these are not compensated (R1, F1, I1). Moreover, from the case studies and interview resulted, that forest owners should pay a tax on production forests for the basis of logging, as they only export wood from the forest once every few years, whilst the municipality demanding payment of the forest land tax every year (CS1, CS4, CS–SK, R1). Generally, another problem with the abolition or reduction of forest land taxes in Slovakia, is the lack of funding for the development of municipalities and, of course, the repair of local roads. In the case of the implementation of more preferential land tax programs, it would be necessary to look for other sources of income for municipalities (Dobšinská et al. 2019; R1).

We also recommend that the local tax administrator ensures, that the employee responsible, for collecting taxes has sufficient information on the issues and requirements of forest management programs as well as should monitor active changes in legislation.

4. Discussion

The forest land tax reduction foreprotection and special purpose forests in Slovakia represents public economic incentive for forest ecosystem services support (Sarvašová et al. 2019) and support all services that are

Table 7. Final evaluation.

Phase	Criterion	Evaluation
PES	Supported FES	Global (-)*
	Packaging of FES	Piggy backing (+/-)
	Voluntariness	Obligatory (-)
	Financing	Public (-)
	Visibility for sellers	Moderate (+/-)
	Visibility for beneficiaries	Low (-)
	Valuation method	Buyer or seller (+/-)
	Additionality	Yes (+)
	PES type	*Other economic incentive*
Formulation (policy output)	Effect	redistributive (-)
	Regulative component	strong (+)
	Motivational component	moderate (+/-)
	Administration difficulty	low (-)
	Accompanying consultation activities	no (-)
	Clearly defined goals	qualitative terms – hectares of forests (+)
	Link to the other policy instruments (policy mix)	implementation relates to more than 2 instruments (+)
	Potential effectiveness	*Moderate potential effectiveness*
Implementation	Policy arena	consensual (+)
	Changes in program parameters	neutral changes (+/-)
	Evaluation methods	active evaluation (+)
	The level of fulfilled goals	fulfilled (+)
	Implementation shortcomings	yes – irrelevant (+/-)
	Policy impacts (changes in recipients' behaviour)	partly (+/-)
	Informative asymmetry	low (+)
	Implementation effectiveness	*High implementation effectiveness*

*Evaluated as low performance (-), moderate performance (+/-), high performance (+).

part of the forest ecosystem in a specific Slovak forest stands (Považan et al. 2014; Kunca & Olah 2016). As Mercer (2004) concluded, the protective function of forest ecosystems provides a wide range of ecosystem services that are considered as public goods. Their production may or may not conflict with private property and its use by the public, and tax breaks are a way to compensate forest owners (Merlo et al. 2000; Kemkes et al. 2010; Costanza et al. 2014).

Successfully implemented examples of land tax incentives are a stable basis of forest and nature protection policy worldwide (IUCN 2009), mainly in USA and Canada (Hibbard et al. 2001; Kilgore et al. 2017). Their expansion dates to the late 19th century, when many states of Northern America have offered tax relief to forest owners (Jacobson, McDill 2003). Nowadays, forest land tax incentives are perceived as other economic incentive for forest ecosystem services that arise mainly from protected lands (e.g., IUCN 2009, Schuster et al. 2017; Barton et al. 2017), moreover are combined with private and mixed voluntary PES schemes, where land under the contract is exempted from the tax (Barton et al. 2017; UNECE 2018). The classification as "other PES" is connected also with visibility for seller and beneficiaries. This kind of the preferential forest land tax program have low "visibility" among beneficiaries and sellers in Slovakia, even that ecosystem services are highly valued by local inhabitants (Bezák et al. 2020). Furthermore, its effectiveness related to ecosystem services support is lower than private PES schemes, but preferential forest land tax programs are politically feasible (Kemkes et al. 2010).

Forest land tax reduction is considered as a redistributive instrument, in which a conflict arena is assumed (Krott 2005; Šálka et al. 2017). However, the evaluation results show the opposite intention in the Slovak case. As our evaluation revealed, the forest land tax reduction arena is neutral to consensual. This is mainly due to the implementation process within local arena, where the actors can more effectively agree communication and thus to increase the quality of mutual coordination.

The formulation effectiveness of the land tax reduction program was evaluated as moderate, whilst implementation effectiveness as high. This opinion is also shared within the respondents, even the self-assessed program effectiveness does not need reflect the actual effectiveness, either (Ma et al. 2014). The effectiveness of economic instruments programs relates to clearly articulated policy goals (Krott 2005; Ma et al. 2014). Due to the automatic granting of forest land tax reductios, its policy goals are met, we consider this instrument to be effective. The similar conclusion was reached by authors Kilgore et al. (2017), who evaluated the State preferential land tax programs in the USA.

In some cases, granting tax reductions are an incentive for forest owners to reclassify their land (Klemperer 2003). In our case, a similar change in the behaviour of the recipients was confirmed only indirectly by the interviews. Moreover, as Giertliova et al. (2019) stated, the biggest advantage of land tax reductios are their transparency and long-term functioning, thus can be combined with other policy instruments to prevent forest conversion to development (Locke & Rissman 2012). If such support did not exist, forest owners and enterprises would try to get their increased costs or reduced earnings into market prices, especially in wood prices, and thus distort the market (Giertliová et al. 2019).

5. Conclusion

Land tax reductios was classified as other economic incentive for supporting forest ecosystem services that arise from exempted forest land categories. The goal of the paper was to evaluate the land taxnreduction´s formulation and implementation effectiveness using a set of criteria based on the policy analysis theory. According to revealed results, the instrument has low visibility among forest owners and beneficiaries but is still politically feasible and effective. Forest owners do not apply for all kinds of facultative land tax exemptions, therefore only partial changes in recipients' behaviour have occurred. The biggest advantage of the instrument is its simple implementation, low administration difficulty and consensual local policy arena. The potential conflicts are easier to solve because actors on the local level mostly know each other. The land tax reduction is considered only as "additional" payment for ecosystem services in special purpose andeprotection forests. The development of other payments for forest ecosystem services in Slovakia is needed. The evaluation analysis has shown that such an application of preferential forest land tax programs can support a wide range of forest ecosystem services at national and local level.

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