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Methodology for satellite control of logging in coniferous forests

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Abstract. Logging is still the predominant utilization of forest ecosystems. The wood obtained by felling is an indispensable natural resource, which is used in a number of economic sectors and this is the reason for the enormous speculative interest in it. This speculative interest is the reason for illegal logging or often prevails in determining the amount of timber envisaged and actually harvested in the legal use of the forest. Despite the institutional and public control of forestry activities, control over illegal logging is difficult to implement due to remoteness, lack of passable roads, corrupt practices, etc. This is the reason for the large share of illegally harvested timber in Bulgarian forests, which is difficult to determine even approximately. This study is aimed at developing a methodology for using multispectral satellite images (with a resolution of 3/3 meters) for quantitative and qualitative control of logging in coniferous forests, by calculating the NDVI (Normalized Difference Vegetation Index) of forest vegetation. The methodology was applied to randomly selected coniferous forests of disthnct forestry units in the cadastral parcel of the village of Tishanovo, Nevestino municipality with various age and level of planned logging, in which felling was carried out. To achieve maximum accuracy, different options for comparing NDVI data from satellite images were researched – during the same seasons and the different seasons of the same year (2019) and during different years (2018;2020). For verification, the results were compared with the data obtained by the same methodology from similar forests in which no logging was carried out. A comparative analysis was performed to verify the findings by the satellite images comparing the amount provided for felling under forest management projects and the officially reported quantities of harvested timber after logging.

Key words: logging, coniferous trees, satellite images, remote sensing, NDVI, forest ecosystems.

Introduction

There are many examples of persistent and major violations in forests and forestry activities. Among them, the biggest negative impact is the smuggling extraction of timber and the exhaustion of forest ecosystems during the main use of forests in the officially permitted for use forest plantations. The management of forestry activities to a great extent is a closed system. The need to have specific competencies, built with special education and significant practical experience for the implementation of economic activities in forests, limits the possibility of institutional and public control. All of the above mentioned shows that the monitoring and control of forest activities needs to be obtained by new, modern methods and technologies from an unlimited range of structures, organizations and people (other state and municipal institutions, non-governmental organizations, educational and scientific structures and even individuals). Those that would not require a specific professional training of foresters.

Such an opportunity for analysis and control of natural sites is provided by remote sensing methods, through the increasing calculating power of computer hardware and software and the improved resolution of free multispectral satellite images. Changes in the area and volume of the forest cover can be analyzed by using multi-resolution optical, synthetic aperture radar (SAR) and/or LiDAR data (Mitchell et al. 2017; Englhart et al. 2013). The first group of data reveals the change in canopy cover or proxies, and others allow to quantify the change in loss of (or gain in) the above ground biomass (AGB). There are also automated mapping software (Asner et al. 2009), that are suitable for large areas with low resolution, but which do not allow their use in selective felling and felling in small forest subdivisions (forestry units). The use of SAR and / or LiDAR is not always very accurate in determining the amount of wood biomass taken away by felling (Nelson et al. 2017), and is limited by access to data and sophisticated calculation methodology, which is still available mainly to researchers.

Studies to detect changes in forest plantations also have been conducted with the semi-automated Interactive Data Language-based tools imageRF and imageSVM (Shchur et al. 2017) for processing multispectral satellite images. But they require terrain verification due to the great structural and plant diversity, as well as the need to select model parameters and mount the hyperplane during optimization. By improving the resolution of these images to 0.5/0.5 meters (3/3 meters free of charge) it is possible to use normalized difference vegetation index (NDVI), through which a change in the canopy cover of coniferous plantations can be calculated with sufficient accuracy. Results even in earlier publications show that changes in NDVI provide important information on forest vegetation growth (Ratnayake 2002). Due to the improved resolution and simplified application, nowadays this method is quite accurate and faster (Nath & Acharjee 2013).

At present, satellite monitoring is still limited to reporting destroyed forests, but not to assessing the quality of forestry activity. And this assessment is crucial for the future state of forest ecosystems. The collection, systematization and analysis of information from a given terrain about the main use in the forests - logging, in the presence of the huge amount of permanently used forest areas throughout the country, it is an extremely complex and laborious process. It requires the necessary competence of a large number of specialists. The creation of indicative methodologies and technologies, allowing for screening the improperly exploited forest plantations among the large number of used areas, would qualitatively change the possibility for monitoring and

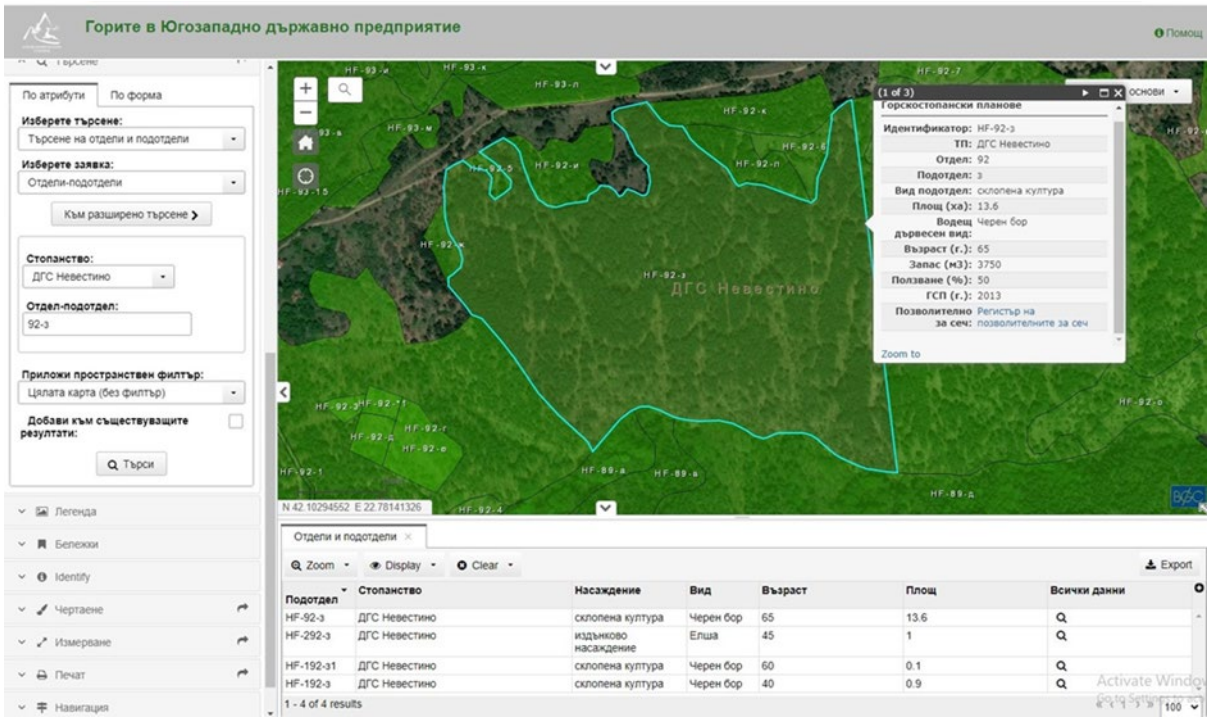

Figure 1. Location, boundaries and assessment characteristics of subdivision 92-z of State Forestry "Nevestino" from the site of Southwestern State Enterprise.

control of the forestry activity. The aim of this article was to make quantitative and qualitative assessments of the felling activity in a randomly selected forest plantation in the land of Tishanovo village, Nevestino municipality (subdivision 92-z) by analyzing the change in NDVI of multispectral satellite images from different years (2018, 2019 and 2020). NDVI index has been broadly use for analyzing the change in the canopy health status, the authors of this research do not work on the methodology of NDVI estimation, this methodology is well known and described in numerous researches, but for the first time in this research the index is used as an instrument for control of the forestry activity. Which lays down a new prospective of NDVI analysis.

Material and Methods

To achieve the goal of this study, automatically radiometrically calibrated multispectral satellite images of the studied objects were used. The images are captured by satellites "Planet scope" of the company Planet Labs Inc. with a spatial resolution of 3 m. The images were taken on January 8, 2019, January 4, 2020, June 8, 2019 and June 7, 2018. The boundaries of the separate forest management units were determined with Shapefiles from the Interactive map of the forests in the territorial scope of the Southwestern State Enterprise (Fig. 1). For the analysis of felling in site 92-z the official data from the Taxation Characteristics of the Subdivision in the Forest Management Project of "Nevestino" State Forestry were used, which are in the public domain. Logging permit № 0477087 / 11.01.2019 from the Register of felling permits of the Executive Forest Agency (Appendix 1) and Protocol for certification of felling site № 0477238 / 05/28/2019 from the Register of the Executive Forest Agency (Appendix 2).

The calculation of the forest cover area before and after felling was performed with Erdas Imagine 2018 Software. NDVI values for coniferous forests were used to separate the forest cover area from the area of sites. Coniferous trees have lower NDVI values (with a peak of 0.36 in forests dominated by coniferous species) compared to deciduous trees (Eigemeier et al. 2012). The software was set to a lower value of the index (above 0.25) in order to take into account the vegetation in which only part of the crown is included in the pixel. In silvicultural theory and practice, the cohesiveness of tree crowns (the degree of proximity of tree crowns) on the area of the terrain overlaps with the canopy cover completeness of all the trees in the forest. It is also used to determine the presence or absence of forest. At values of cohesion of tree crowns below 40%, this density does not correspond to a forest ecosystem, because the trees do not interact and these trees do not have the functions of a forest ecosystem. Furthermore the best forestry practices support the idea that maintaining the forest with a fullness of less than 70% is not appropriate as well . The resolution of the satellite images used sufficiently takes into account the open "windows" in the cohesion of tree crowns and thus the lack of vegetation is registered.

To achieve the required accuracy and exclude errors in the calculation of NDVI, 3 variants of the methodology were studied, in a different combination of seasons and years when comparing the data.

Version 1: Comparison of NDVI values for subdivision 92-z obtained from satellite images for the period before the beginning of felling and after certification of the felling area (January 8, 2019 and June 8, 2019). In this variant, due to the change of the season (winter and summer), the values of the black pine forest area were almost identical (with an insignificant decrease), despite cutting the values for deciduous vegetation in the summer season from the photo. We attribute this to the transparency of grass and bush vegetation through the torn cohesion of tree crowns in the forest, which at this resolution is mixed with the values of black pine coniferous forest, diluted after felling. Thus, values in the range of coniferous vegetation are obtained. Due to this reason Version 1 cannot be used for assessment the changes in forest cover.

Version 2: Comparison of NDVI values for the studied object obtained from satellite images for the time around the end of felling (certification of the felling area) in two different years - the year of felling and the previous year (June 8, 2019 and June 7, 2018). The values of deciduous vegetation were cut off. In this variant, however, as in the first, the values were close, as even after the felling in 2019, it showed a slight increase in the area of the black pine forest. The most probable reason for this increase is the different precipitation regime

for the year of felling. Due to this reason Version 2 also can not be used to assess the change in forest cover.

Version 3: Comparison of the NDVI values for subdivision 92-z, obtained from the satellite images before the beginning of felling for the winter periods in two different years – the year of felling and the following year (January 8, 2019 and January 4, 2020). In this variant, significant differences were found in the area of the stand in terms of a significant reduction in its size. Figure 2 clearly shows bared areas of forest roads, temporary storage for harvested timber and felled areas larger than 250 m². Both satellite images are from the winter season, when deciduous vegetation is defoliated, and for coniferous vegetation, the amount of precipitation does not significantly affect the NDVI values, as it is also in a growth pause. All of the abovementioned gives us reason to use Version 3 to assess the change in forest cover.

To verify the methodology, the same analysis was performed on two groups of similar forests in the same land: first with plantations where felling was carried out (subdivisions 92-a; 92-b) and second - with plantations, in which no felling has been carried out in the recent years (350-r; 350-s; 350-u). The forests in the studied sites are from artificially created black pine plantations (*Pinus nigra* Arnold) aged 30 to 65 years.

These control areas confirmed the possibility of using Version 3 of the methodology for reporting changes in the forest cover of coniferous forests due to felling. In subdivisions 92-a and 92-b, breeding felling was carried out in 2017 and the NDVI values also show a drastic reduction of the forest cover from 12.58 ha to 5.21 ha. In the control area in subdivisions 350-r, 350-s and 350-u, on which no felling was carried out, an increase from 35.51 ha to 37.45 ha is observed. This is normal for the tree species and their age (25-30 years), considering the high growth rate of trees and thickening of the crowns and covering of non-cohesive areas.

Results and Discussion

The comparison of values from satellite images for the two winter periods (2019 and 2020) shows a decrease of 46.2% compared to the afforested area and 42.9% of the total area of forested land in subdivision 92-z (Fig. 2-3, Table 1.). Determinative for the condition of plantation is the change in relation to the afforested area, because the rest of the territory of the forest management units are terrains, including roads, clearings, meadows and unsuitable areas. This reduction is extremely large and does not correspond to the expected result on the forest cover in case of correct implementation of the short-term gradual felling envisaged under the Forest Management Project (lighting phase) and the envisaged area of felling under LOGGING PERMIT № 0477087, which is essentially the same. Moreover, after the felling, more than half of the growing season has passed until the second report, which added more biomass to the wood vegetation left in the subdivision.

Characteristic of the methodology of gradual felling (in this case the lighting phase) is the uniform felling of 25% of all trees over the entire area, whereby small "windows" open, by cutting down individual trees or small groups, so that the solar radiation can reach the ground and create conditions for seed germination and undergrowth. The obtained results indicate a large fragmentation of the tree cohesion complex and in fact a lack of forest or fullness below 0.5 (tree cohesion below 50%), rather than its dilution. In addition, during a manual inspection of areas with values below the reference values, 10 bare areas with a size of over 250 sq.m were found and fully open terrains near the forest roads, which are clearly seen in the satellite image before felling that they are covered by the crowns of the trees.

Analysis of change in NDVI, under Version 3 of the methodology used, for a manually separated area with a rectangular shape of 40.85 ha, including subdivision 92-z and adjacent territories, also shows a significant reduction in forest cover (Table 2.). This extension of the study was necessary, to check whether the common practice of logging in the adjacent areas of the intended subdivision for which no logging permit has been issued has been used. From an examination of the issued permits for logging for 2019 it was established that only for 2 subdivisions there is a permit for use by a total of 15 bordering subdivision 92-h, as they have the smallest share in the area of the neighboring territories.

The tree species in the neighboring subdivisions are respectively - black pine (*P. nigra*) in 13 subdivisions and Scots

Table 1. Change in the terrains with forest cover under NDVI in subsection 92-z for 2019 and 2020.

Object	Total area (ha)	NDVI forest area for coniferous forests		Difference in area (ha)	Change in relation to the afforested area (%)	Change in relation to the total area %
		January 8, 2019	January 4, 2020			
92-z	13,6	12,61	6,78	- 5,83	- 46,2	- 42,9

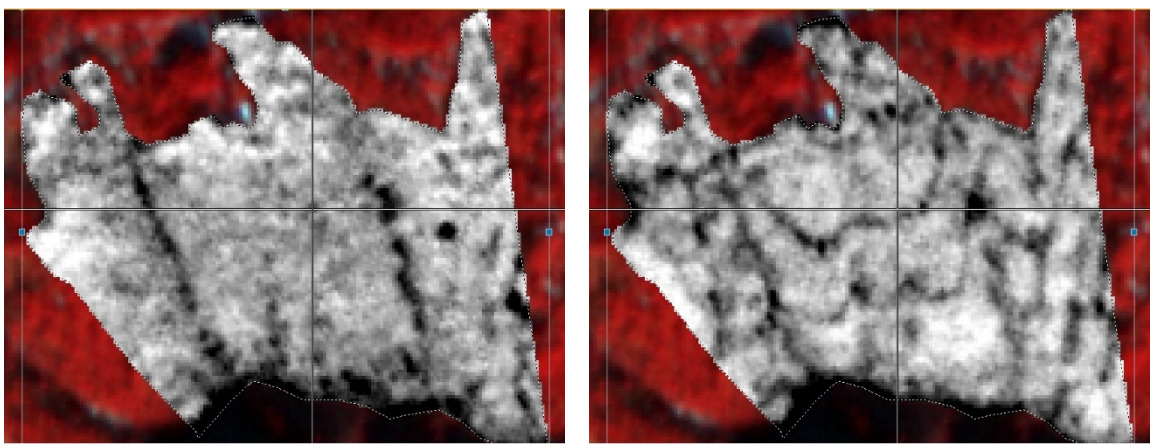

Figure 2. Images on the territory of subdivision 92-z after calculation of NDVI for 2019 (left) and 2020 (right).

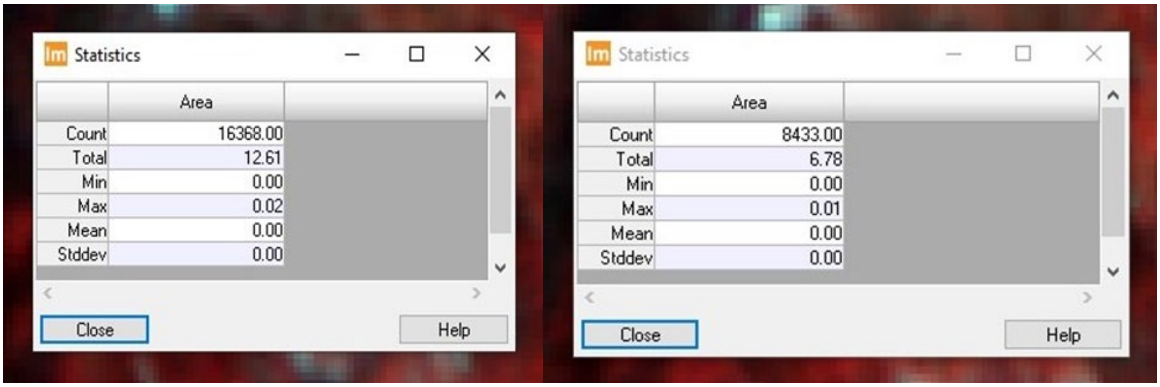

Figure 3. Attribute tables from the ERDAS IMAGINE program on the area of the terrains with forest cover in subsection 92-z, calculated with NDVI index for 2019 (left) and 2020 (right).

Table 2. Change in the terrains with forest cover under NDVI in a detached area, including subdivision 92-z and neighboring territories for 2019 and 2020.

Object	Total area (ha)	NDVI forest area for coniferous forests		Difference in area (ha)	Change in relation to the afforested area (%)	Change in relation to the total area (%)
		January 8, 2019	January 4, 2020			
Detached area	40,85	31,45	15,87	- 15,85	- 49,5	- 38,8

pine (*Pinus sylvestris* L.) in 2 subdivisions. Therefore, the biggest change to the reduction of the areas with forest cover in neighboring areas is the result of illegal logging with similar intensity. These conclusions are also confirmed by the appearance of many large bare areas after felling, on the territory of the researched site (92 –z) and in the neighboring subdivisions, which fragments the forest ecosystem.

Opposite to the big change (42.9 %) of the area covered with coniferous forest in the subdivision of interest (92 z) the analysis of the NDVI values of the control subdivisions with plantations, in which no felling has been carried out in the recent years (350-r; 350-s; 350-u) shows a negligible change of the NDVI values that represent coniferous forest - less than 10 %. Furthermore the analysis of the NDVI values of the control subdivisions in two consecutive years, where felling was carried out (subdivisions 92-a; 92-b) also shows huge negative change in the NDVI values that represent coniferous forest. These data once more confirm the effectiveness of the methodology.

The biggest problem with the logging activity in forestry is the control over the type and quantity of harvested timber during the felling. This is usually a long process, sometimes even continuing in the following year. This gives a great opportunity to the participants in the felling to transport the harvested timber once without being noticed by the forest officials and a second time, to take them out of the felling area and their employees been aware of that, but without the possibility of detection by other control bodies. Usually the control over the quantity of extracted materials and the quality of the silvicultural activity is ex post facto, but it also requires a great deal of time and expert forester potential. Therefore, the certification of felling sites is often formal and close to that prescribed by the Forest Management Project. For this reason, it was necessary to check the methodology used, by comparing its results with reporting activity of the forestry. The logging permits and the Protocols for certification of felling areas are in the public domain and the remote sensing methods can be used as instrument for verification of data filled in both documents.

When comparing the data from the Logging Permit and the Protocol for certification of the felling area with the obtained results for the surveyed site, a difference of more than 2 times is observed between cut off according to the report in relation to the total stock of the plantation and the reduction of the forest cover found with the NDVI index (Table 3.). Of interest for the present study are the data from the Protocol for certification of felling № 0477238 of subsection 92-z (Table 4.) and how they correspond to the drastically reduced forest cover.

The prescription has been formally observed - the quantity of harvested wood should not be significantly different from the quantity provided for felling – the excess is 26.2 m^3. This is only a quantitative indicator and if it is correct, to some extent it satisfies the claims of society for a responsible attitude of the forest administration to its tasks - management and protection of forest ecosystems, set in principle in the legislation and specifically in the Forest Management Project.

Of great importance are the data on the difference between what is allowed for use and what is certified as actually cut by assortment (size of construction timber and firewood). These data clearly demonstrate the opposite trend compared to what is planned. Felling of large timber 3.14 times more is reported, 1.64 times less medium-sized construction wood and 13 times less firewood. At this age of the trees, this ratio proves that the felling was aimed at the largest trees, which are the trees of the future and the least developed and hopeless are left uncut. The result will be: forests with lower quality indicators, productivity and environmental functions.

The harmful trend shown in the table is in agreement with the results of the NDVI study for the changes in the forest cover after felling is carried out in the researched site. The felling of the largest trees, which also have the most

Table 3. Provided and reported quantity of wood mass and change in the forest cover after felling registered with NDVI.

Object	Area, (ha)	Total stock (m3)	Provided for use by logging permit (m3)	Provided compared to total stock (%)	Cut off by Protocol for certificationм3	Cut off by report relative to the total stock (%)	Reduction of forest cover according to NDVI relative to the forested area (%)
92-з	13,6	3750	781	20,8	807,2	21,5	46,2

Table 4. Intended for felling and actually cut by assortment in subdivision 92-z (of PROTOCOL for certification of felling site № 0477238).

№	Wood category	Tree species	Lying wood mass in cubic meters	
			By permission for logging	Actually cut off
1.	Large	*Pinus nigra*	184	578.56
2.	Medium-sized	*Pinus nigra*	345	209.96
3.	Small	*Pinus nigra*	10.0	
		Pinus nigra	228	16.48
4.	Firewood	*Quercus frainetto*	6	2.20
		Quercus cerris	8.0	
5.	Tops	---	---	---
Total quantity:			781	807.2

developed crown, leads to the opening of larger "windows" in the cohesion of crowns in the forest and above all to a greater reduction in its planting density. This supports the change in the area of the forest cover registered through the remote sensing method.

Two factors are important for the effectiveness of an analysis methodology: time and cost (expenditure of funds). The technological time for analysis of changes in the forest cover due to felling activity with the methodology and software used can be reduced substantially depending of the size of the area of interest. For example when using free satellite images with a resolution of 3/3 m, the costs of the analysis of the area of interest in this research are reduced to the valuation of these 20 minutes of working time and software and office maintenance deductions, again for the same period of time. This rough calculation shows a huge difference in the cost of time and money compared to traditional field methods. For this reason, remote sensing methods provide unlimited time and space to check a large number of objects and subsequent referral of specialists to problem logging for field inspection and sanctioning.

Conclusions

Based on the evidence obtained in the quantitative and qualitative analyzes of the felling activity in forest plantations of coniferous forests performed in this study, through the use of satellite data, the following conclusions can be made:

- The methodology precisely locates the boundaries of the forest management units and differentiates the type of violations - illegal or improper carried felling.

- The maximum accuracy is achieved with the third of the three variants of the methodology studied - comparison of NDVI values for the winter periods in the year of felling and the following year.

- The reduction of the forest cover found with the NDVI index is more than 2 times in a negative direction compared to the officially reported amount of felled wood (46.2/21.5).

- When using this remote method, the fragmentation of the forest cover during felling is accurately documented by removing the forest on large bare areas - unacceptable from an ecological point of view and according to silvicultural science.

- The methodology is confirmed by the official reports on the type of harvested wood, which indicate an opposite trend to that provided by the logging permit – cutting down the largest trees instead of the ones lagging behind in growth. This predetermines negative trends in the development of the forest ecosystem for decades into the future.

- The use of remote sensing methods allows to assess the pace and direction of development of natural and artificial coniferous forests, now and back in time on an unlimited area, not just in individual test plots.

- Using the methodology significantly reduces the time and costs for analysis of changes in the forest cover of coniferous forests due to felling. It is simple and does not require specialized forestry education. This makes it an effective indicative method for detecting disturbances in forests.

- It is necessary to create an external control center for remote monitoring, independent of the forest system and state structures in which, through the use of remote methods, to perform quantitative and qualitative analysis of the use of this valuable and indispensable resource - forests.

References

Eigemeier, E., Heiskanen, J., Rautiainen, M., Mõttus, M., Vesanto, V., Majasalmi, T., Stenberg, P. (2012): Narrowband Vegetation Indices for Estimating Boreal Forest Leaf Area Index. pp.1-30. In: Escalante, B. (ed), Remote Sensing – Applications. InTech.

Englhart, S., Jubanski, J., Siegert, F. (2013): Quantifying Dynamics in Tropical Peat Swamp Forest Biomass with Multi-Temporal LiDAR Datasets. Remote Sensing 5(5): 2368-2388.

Gregory Paul Asner, G. P., David E. Knapp, D. E., Aravindh Balaji, A., Guayana Paez-Acosta, G. (2009): Automated mapping of tropical deforestation and forest degradation: CLASlite. Journal of Applied Remote Sensing 3(1): art.033543.

Mitchell, A.L., Rosenqvist, A., Mora, B. (2017). Current remote sensing approaches to monitoring forest degradation in support of countries measurement, reporting and verification (MRV) systems for REDD+. Carbon Balance and Management 12: art.9.

Nath, B., Acharjee, S. (2013): Forest Cover Change Detection using Normalized Difference Vegetation Index (NDVI): A Study of Reingkhyongkine Lake's Adjoining Areas, Rangamati, Bangladesh. Indian Cartographer 33: 348-353.

Nelson, R., Margolis, H., Montesano, P., Sun, G., Cook, B., Corp, L., Andersen, H., de Jong, B., Pellat, F.P., Fickel, T., Kauffman, J., Prisley, S. (2017): Lidar-based estimates of aboveground biomass in the continental US and Mexico using ground, airborne, and satellite observations. Remote Sensing of Environment 188: 127-140.

Ratnayake, R. (2002): Forest cover estimation using normalized difference vegetation index (NDVI) in plantation forest. Proceedings Volume 4542, Remote Sensing for Agriculture, Ecosystems, and Hydrology III: 1-10.

Shchur, A., Bragina V.E., Sieber, A., Pidgeon, A., Radeloff, V. (2017): Monitoring selective logging with Landsat satellite imagery reveals that protected forests in Western Siberia experience greater harvest than non-protected forests. Environmental Conservation 44(2):1-9.

***** Forest Management Project of "Nevestino" State Forestry. <www.gori.uzdp.bg>

Appendix 1. Logging permit № 0477087 / 11.01.2019 from the Register of logging permits of the Executive Forest Agency (http://new.iag.bg/cgi-bin/Print_PozvSech.cgi?asdfuyoiyoisgdhuioy=477087&jklfhlkasjfhduwi-oefuoived=819f3badf21fd0fc08134a6e7103680ea3e866dc)

ИЗПЪЛНИТЕЛНА АГЕНЦИЯ ПО ГОРИТЕ

Регионална дирекция по горите **Кюстендил**

ВИД НА СЕЧТА : **Краткосрочно постепенна - Осветителна фаза**

ПОЗВОЛИТЕЛНО за СЕЧ № 0477087

На основание чл. 108 от Закона за горите, Заповед № **340/19.05.2014** г. за утвърждаване на горскостопански план (горскостопанска програма), одобрено план-извлечение (одобрен инвентаризационен опис) изх. № **/** г., издадено предписание (от РДГ или ЛЗС) изх. № **/** г. разрешава се на **.....** , представител на **Мултигор ООД** , да извърши сечта в отдел № **92**; подотдел **з**; имот с (кадастрален/КВС) № Община **Невестино**; Землище **Тишаново** площно сечище от **12.000** хектара. Собственост : **ДГТ** Дърветата са маркирани от **.....** с контролна горска марка № **Б 1038**, с **синя** боя, дата на карнет опис: **14.09.2018** г. Очакваният добив е **781.0** плътни кубически метра лежаща маса, която по категории е както следва :

№	Категория дървесина	Дървесен вид	куб. м.	Забележка
1.	Едра строителна дървесина	**Черен бор**	**184.0**	
2.	Средна строителна дървесина	**Черен бор**	**345.0**	
3.	Дребна строителна дървесина	**Черен бор**	**10.0**	
4.	Дърва	**Благун**	**6.0**	
		Цер	**8.0**	
		Черен бор	**228.0**	
5.	Вършина	---	---	

Допълнителни изисквания при провеждане на сечта : **Да се спазва ЗГ и подзаконовите актове по прилагането му.**

Срок за провеждане на сечта от **14.01.2019** г. до **31.12.2019** г.

Срок за извозване на материалите от сечището от **14.01.2019** г. до **31.12.2019** г.

Начин на почистване на сечището : **Събиране на отпадъците на купчини в сечището. Да се изнасят битовите отпадъци извън горските територии на определените за това места.**

Материалите ще се извозят до временен склад : **извозен път - съгласно техн. план**

Издал:..... Получил позволителното:.....

/ **.....** / / **.....** /

Дата: **11.01.2019** г. Издал служител : |.....| Код: |.....|

Място на издаване на позволителното за сеч:

Област **Кюстендил**, община **Невестино**, землище **Невестино (Кн)**, адрес, подотдел, GPS координати: .....

ЗАВЕРКИ ПРИ ПРОДЪЛЖАВАНЕ СРОКОВЕТЕ ЗА СЕЧ И ИЗВОЗ

За провеждане на сечта до : ..... г. За извоз на материалите до : ..... г.

Издал: .....

/ /

Продължаване на сроковете за сеч и извоз става само чрез информационната система на ИАГ.

Appendix 2. Protocol for certification of a felling site № 0477238 / 28.05.2019 from the Register of the Executive Forest Agency.

ИЗПЪЛНИТЕЛНА АГЕНЦИЯ ПО ГОРИТЕ

РЕГИОНАЛНА ДИРЕНЦИЯ ПО ГОРИТЕ **Кюстендил**

ПРОТОКОЛ за освидетелстване на сечище № **0477238**

Към позволително за сеч № 0477087/11.01.2019 год.

Днес: **28.05.2019** год., на основание чл. 109 от Закона за горите се състави настоящият констативен протокол от: **.....**

в присъствието на: **.....**

1. След съвместно обхождане и проверка на сечището в Община: **Невестино**; землище: **Тишаново**; Отдел: **92**; Подотдел: **з**; Кад. № ;

собственост на: **ДГТ**, и на всички документи

за сечта и добива на материалите констатира:

Площ по позволително за сеч (ха): **12.000** | Сечта е проведена на площ (ха): **12.000**

№	Категория дървесина	Дървесен вид	Лежаща маса в куб. м.			
			По позволително за сеч	Действително отсечено	Наличност в сечището	Налично на временен склад
1.	Едра	**Черен бор**	**184**	**578.56**		
2.	Средна	**Черен бор**	**345**	**209.96**		
3.	Дребна	**Черен бор**	**10.0**			
4.	Дърва	**Черен бор**	**228**	**16.48**		
		Благун	**6**	**2.20**		
		Цер	**8.0**			
5.	Вършина	---	---	---	---	---
		Общо количество:	**781**	**807.2**		

Налични неотсечени маркирани стъбла : **Не**

Разликите между количествата и категориите дървесина, по позволително за сеч и фактически добити в повече или в по-малко се дължът на следното:

2. При сечта и извоза на дървесина са допуснати следните нарушения на Закона за горите:

3. Провеждането на сечта и почистването на сечището е извършено според определения начин в технологичния план и позволителното за сеч: **Задоволително**

4. За допуснатите нарушения е съставен акт за установяване на административно нарушение № / на:

5. За подобряване състоянието на насаждението в срок до: следва да се проведът следните мероприятия:

Съставил: .....

.....

Присъствал: .....

.....