Article

A Geospatial Decision Support System tool for supporting integrated forest knowledge at the landscape scale

Supplementary Materials

1. Analysis of Literature of existing Forest DSS

In order to get some understanding about whether and how open source and web capabilities have been implemented into S-DSS applied to forestry, we have reviewed current DSS literature, primarily the works carried out by Packalen [30] and secondly Borges [31]. We found out that among the 62 DSS-like software systems dealing with forest management (from 23 countries) and reported within FORSYS Wiki (http://www.forestdss.org/wiki/index.php?title=Main_Page), none of them had all of the following attributes: (i) open-source codes, (ii) web-based systems, and (iii) geospatial analysis [30]. A detailed metanalysis overview about the Forest DSS systems is provided in Table S1. We re-adapted Packalen's work reporting, for each DSS: (i) country where it was developed, since no information of applications in another country; (ii) whether spatial analysis features were used; (iii) graphic user interface on the web; (iv) whether the application is built on a GIS (either as an integrator or as a user interface); (v) open-source codes.

2. Description of Report for Forest Planning

Private forest owners in Campania Region, who aim at optimizing forest resources by performing harvesting plan, must comply with Regional Regulation of Campania Region. It is stated by RR [48] that in order to harvest: (i) coppices (with reserves, mixed or selection) with total surfaces greater than or equal to 2 hectares and less than 10 hectares, in the absence of a Forest Management Plan; (ii) high forests and coppices in conversion to high forests for a total area greater than or equal to 0.5 hectares and less than 10 hectares, in the absence of a Forest Management Plan, it is compulsory to obtain a prior authorization for cutting. For the above referred purposes, the owner, or other legitimately authorized person, must present a specific request in order to get a cutting authorization [50]. The request consists in a report that must contain the following information regarding: cadastral data of the forest area, total area to be harvested, classification of the territorial context in which the forest falls with the specification of any restrictions (whether present), main dendrometric parameters of the stand, etc. The entire required information that must be contained in the report according to the regional forestry law and the parameters that can be provided by the GIFT tool is available in Table S2 .

Table S1: Functionalities of the FORSYS wiki software (adapted from Packalen et al., 2013) and ForestDSS Wiki (accessed on 27/07/2019).

Name	Country of DSS development	Spatial analysis module	GUI on the Web	GIS module	Open-source
AFFOREST-sDSS	Belgium	x		x	no
CONES	Austria	x		x	no
Conifer Timber Quality	Great Britain		x	x	no
DSD: Decision Support Dobrova	Slovenia	x		x	no
DSS for managing forest fire casualities	Greece	x		x	no
EFIMOD	Russia	x		x	no
EMDS	USA	x		x	yes (can be downloaded)
EMIS	Great Britain		x		no (need to register)
FORESTAR	China	x		x	no
ForestGALES	Great Britain	x			no
ForMIS	Estonia		x		yes
Geo-SIMA-HWIND	Finland	x		x	no
Habplan	USA	x		x	no
HARVEST	USA	x		x	yes (software can be downloaded)
Heureka	Sweden	x			yes (software can be downloaded)
HMSS	Great Britain		x		no info available
LANDIS	USA	x			yes (can be downloaded)
LEaRNForME	Italy	x		x	web-page not available
LMS	USA	x			web-page not available
MELA	Finland		x		web-page not available
Mesta	Finland		x		web-page not available
Microforest	South Africa	x	x	x	no
Monsu	Finland	x			no
Monte	Spain (Catalona)	x			no
NetWeaver	-		x		no info available
PYL	Germany (Saxony)	x	x		no
Planflor/SADPOF Portugal	Portugal	x	x	x	yes, but it was not possible to find a link to the DSS
SADMVMC	Spain (Galicia)		x	x	yes, but it was not possible to find a link to the DSS
SGIS	Norway	x		x	no
Sim4Tree	Belgium	x			no
SIMPPLLE	USA	x			no info available
SIPAFIT	Italy		x	x	no
TEAMS	USA (Arizona)	x		x	no
Forest Time Machine	Sweden	x		x	no
WIS.2	Switzerland	x		x	no

Table S2. Main information that must be contained in the report that the forest owner must provide to the competent authority according to the regional forest law and the related items that the S-DSS can provide him/her with.

Parameter	Description according to law	Provided by GIFT tool		Must be provided by the end-user
		Totally	**Partially**	
A	general information of the applicant	no	no	yes
B	documentation or self-certification attesting the possession of the forest	no	no	yes
C	cadastral data of the forest	yes	-	Yes, if a more updated information is available
D	the total area and the area to be cut and harvested	yes	-	Yes, the end-user must draw the AOI
E	Surface of any clear cut (including reserves coppices) occurred either in the previous three years for coppices or the last five years in high forests. Eventual previous clear cuts must be declared if they have been performed in the nearby of forest to be subjected to the cut, even if they have interested properties other than that of the applicant for authorization	no	no	yes
F	year and method of execution of the last cut	no	no	yes
G	classification of the territorial context in which the forest falls with the specification of any restrictions (whether present)	yes	-	no
H	description of the topsoil and the type of intervention, especially regarding the choice of the reserves / single individuals to be left after the cutting (for coppices)	-	Yes (types of intervention)	yes
I	list containing the precise number of the reserves/single individuals left within coppices after the cut and main dendrometric parameters of the stand	no	Yes (main dendrometric parameters of the stand)	Yes (list of precise number of the reserves/single individuals left within coppices after cut)
J	quality and quantity of wood assortments and related extraction methods		Yes (quantity of wood assortments and information on possible extraction methods)	Yes (specification on extraction method according to machines availability and harvesting conditions at felling site)
K	destination of residuals after the cut	no	Yes (indication according to forest prescription within the AOI is give, but it needs to be better defined by the end-user according to his/her necessities)	Yes (according to needs)
L	chorography on a scale of 1: 10,000 and 1: 25,000, highlighting of the cutting AOI, main and secondary roads (forest tracks) within the forest	yes	-	Yes, if more updated information is at the end-user's disposal
M	cadastral planimetry in scale 1: 2.000 or 1: 4.000, with the indication of the cutting AOI of the previous cut in the nearby areas (continuity), as indicated in point E	no	no	Yes, if more updated information is at the end-user's disposal
N	photographic documentation	-	Yes (photo of the sampling plot areas according to that specific forest typology)	Yes (more precise and updated information is always preferred)
O	a copy of eventual authorization documents, whether prescribed by the current regulation in relation to the presence of specific constraints (Natura 2000, hydrogeological riskful areas, etc).	-	Yes (presence of specific constraints (Natura 2000, hydrogeological riskful areas for mass movements)	Yes (eventual authorization documents)

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