

Article DOI: <http://doi.org/10.15544/RD.2017.181>

DO WE NEED PROTECTIVE PLANTATIONS ALONG RAILWAYS (LITHUANIAN CASE STUDY)?

Remigijus ŽALKAUSKAS, Institute of Forest Biology and Silviculture, Faculty of Forest Sciences and Ecology, Aleksandras Stulginskis University, Studentu str. 11, LT-53361 Akademija, Kaunas distr., Lithuania; remigijus.zalkauskas@asu.lt (*corresponding author*)

Edmundas BARTKEVIČIUS, Institute of Forest Biology and Silviculture, Faculty of Forest Sciences and Ecology, Aleksandras Stulginskis University, Studentu str. 11, LT-53361 Akademija, Kaunas distr., Lithuania; edmundas.bartkevicius@asu.lt

Edgaras LINKEVIČIUS, Institute of Forest Management and Wood Sciences, Faculty of Forest Sciences and Ecology, Aleksandras Stulginskis University, Studentu str. 13, LT-53361 Akademija, Kaunas distr., Lithuania; edgaras.linkevicius@asu.lt

Julius BAČKAITIS, Institute of Forest Biology and Silviculture, Faculty of Forest Sciences and Ecology, Aleksandras Stulginskis University, Studentu str. 11, LT-53361 Akademija, Kaunas distr., Lithuania; nevietiniss@gmail.com

Kšištof GODVOD, Institute of Forest Biology and Silviculture, Faculty of Forest Sciences and Ecology, Aleksandras Stulginskis University, Studentu str. 11, LT-53361 Akademija, Kaunas distr., Lithuania; ksistof.godvod@asu.lt

Differently to other European countries Lithuania has inherited from Soviet time period quite wide protection zones of state importance with wooden plantations along railways. Those protection zones vary from 20 m (in cities) up to 45–70 m (in rural areas) in one side. The planted or spontaneous wooden plantations within those zones occupy over 2 thous. ha. The status of protective plantations serve for multifunctional purposes by ensuring railway traffic safety, mitigating negative impact of railway traffic, exhibiting Lithuanian landscape for travellers, improving landscape connectivity, living and working environment quality. At the same time there is a challenge for proper management of those plantations and profitability. In the middle of XX century planted pioneer species reach or is going to reach mature age. There is the threat of increasing number of dangerous trees, challenge for ensuring continuous cover of protective plantations, their services and structure match for predominating function.

This study presents the challenges for future development and society preferences to services of protective lineside plantations along railways. The results of analysis of present condition of railway lineside vegetation, as well the results of social survey showed, what it is not enough just to manage the dangerous trees for railway safeness but it is essential complex means for protective plantations development, services succession.

Keywords: lineside vegetation, railways, protective plantations, social preferences

INTRODUCTION

The length of Lithuanian railway infrastructure is 1868 km (Ministry of ..., 2017). Forest/greenings land within railway infrastructure protection zone is more than 2060 ha. Most of protective plantations were established in 1950–1970. According to available forest/green areas inventory data 36,2 % of all plantations along railways are in mature age. Majority of fast growing species (birch, aspen, grey alder, goat willow, crack willow) has already reached their mature age. The main wooden vegetation management activity for long time was just management of dangerous trees. Nowadays the challenge for JSC Lithuania Railways (responsible for the management of state land of railway protection zone along railway infrastructure) is to ensure further proper management of lineside protective vegetation or to make decisions about the need of quite wide belt of protective plantations along railways on state “shoulders”. Differently to other European countries Post Soviet countries have heritaged wide protection zones along railway infrastructure – more than 90 m wide protection zone with state ownership land in total in rural landscape or 45 m in rural landscape including 25 m protective plantations in one side (Fig. 1). While in other countries just up to 20 m vegetation maintenance zones (not necessarily all land state owned) in one side of railways predominate (Trafikverket, 2017, SBB CFF FFS, 2010). The main purpose for establishment of those plantations in Soviet time in Lithuania was to ensure safe rail traffic against the snowbound (Armolaitis et al, 2003). In relation to climate change winters become milder, so other lineside vegetation functions also may become more important today, for future. While reestablishing or maintaining protective plantation of mature age another design of protective could be suggested for predominating functions. For example, from green infrastructure development point of view lineside vegetation may mitigate negative impact of natural habitats fragmentation, caused by railway network barriers. By preliminary calculation – by overlaying Nature frame areas of Lithuania and railway network areas – about ½ of railway infrastructure protection zones are within Nature Frame areas

and 1/5 of railway infrastructure protection zones are within migration corridors of Nature Frame (Fig. 2). The Nature Frame of the territory of the Republic of Lithuania and State policy of its conservation is set up in the Master (General) Plan of the Territory of the Republic of Lithuania (Kavaliauskas, 1994; COMMUN, 2017) From landscape connectivity, green infrastructure point of view railway lineside protective plantations could be important as well. From other hand large animals migration may create large vertebrates - train collisions (Jaren et al, 1991).

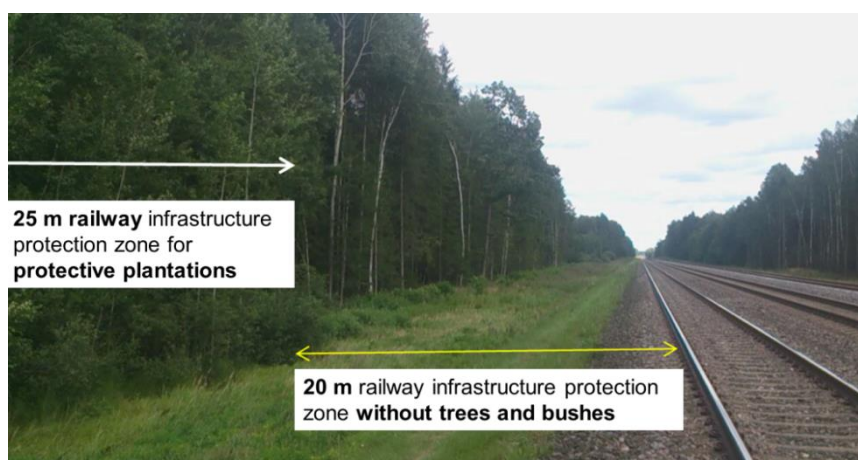


Figure 1. The heritage from Soviet time – wide (45 m+45 m) railway infrastructure protection zones

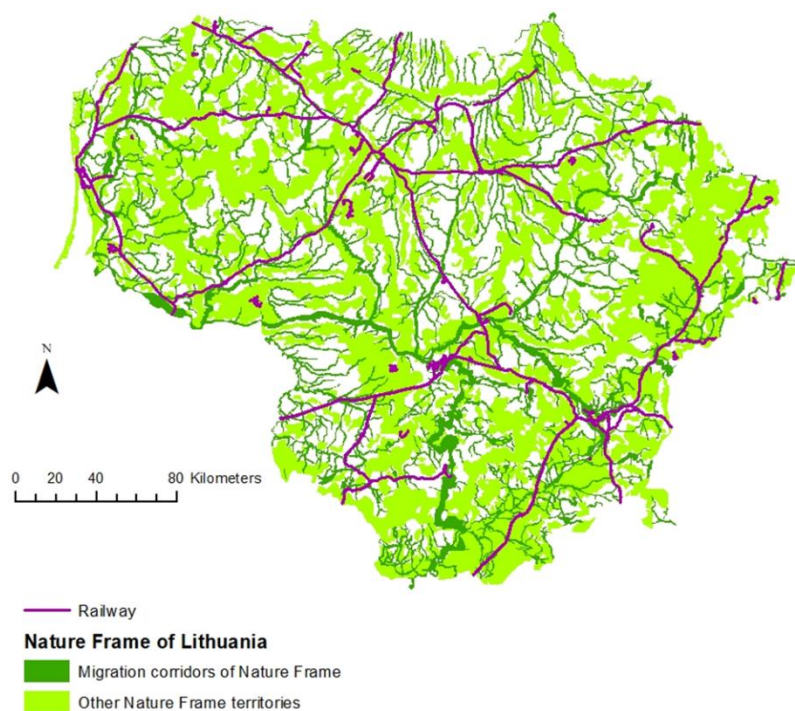


Figure 2. Conflict between Lithuanian railway network and foreseen landscape connectivity/ Lithuania Nature Frame development

There is limited availability of research worldwide done on the railway protective wooded plantations services. Much more attention is on weed control nearby railways (The International ..., 2016; CP Rail, 2015; Victorian Rail ..., 2007).

This study also relates to public opinion about railway lineside vegetation in their neighbourhood. In sustainable landscape management it is an important participatory process designed to enable local people to be part of decision-making. Also, like in Great Britain, JSC Lithuania Railways “wants to be seen as good neighbour” (Network Rail, 2017). By preliminary calculation – by overlaying Geospatial data of the 2011 Population and Housing Census of the Republic of Lithuania (Official statistics ..., 2017) by grid 2500 m and railway infrastructure data – about 17% of Lithuanian population live less than 500 m away from railway line.

This study presents the challenges for future development and society preferences to services of protective lineside plantations along railways.

METHODS

The social questionnaire about local society opinion about railway lineside vegetation was carried out in 2016 in summer time in 3 different Lithuanian regions. 123 respondents living in railway neighbourhood were interviewed – 52

respondents from Kazlu Ruda district, 41- Rokiskis town, 30- Rokiskis district. The regions relate to experimental strips of vegetation inventory research work ordered by JSC Railway Environment Protection Centre. The respondents were divided in social groups with expectation that the social groups might be factor influencing preferences on protective lineside plantations services and et ct. Respondents are in quit equal distribution between the gender, middle aged respondents predominate, 1/3 of respondents has any experiences with higher education, almost 90% of respondents lives close to railway protective lineside plantations (Fig. 3).

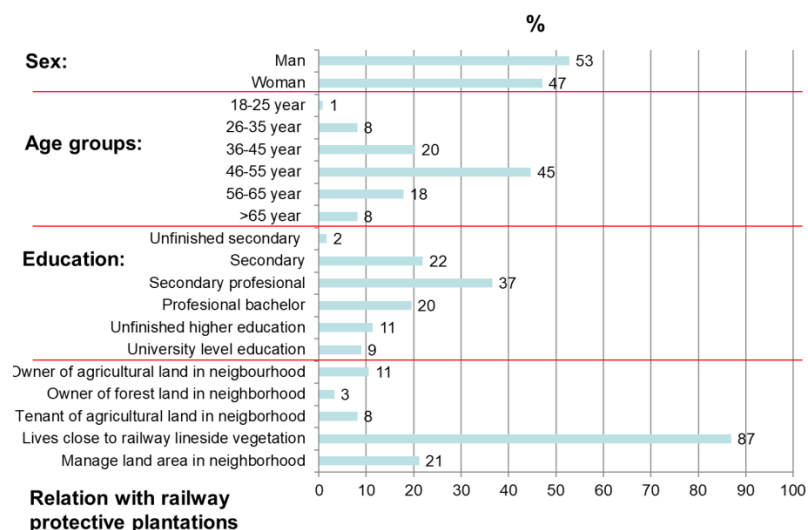


Figure 3. Respondents' distribution according social groups

RESULTS AND DISCUSSION

The local society clearly recognises the protective functions among other but also see the aesthetic functions, even economic ones (Fig. 4). There are no significant differences obtained in answers among social groups. Just the respondents with higher education, it seems, are more likely recognise the need of lineside railway vegetation for the biodiversity support – for landscape connectivity. During the establishment of protective plantations in Soviet time various tree and bush species (including alien, invasive) were planted. Such plantations could be interested from the educational and research point of view but less from local people. Local society does not see clear recreational functions along railways as in other European countries (especially in abandon railways) to use them for bike trace, footpath. Usually green areas in neighbourhood are used quite frequent. Grahn and Stigsdotter (2003) studies shows that an individual who lives 50 m or less from an urban open green space visits it 3–4 times weekly, but when the distance was 300 m, the number of visits reduced to an average of 2,7. Main reason for low recreational interest of local people in railway case could be low level of vegetation maintenance, no recreational paths.

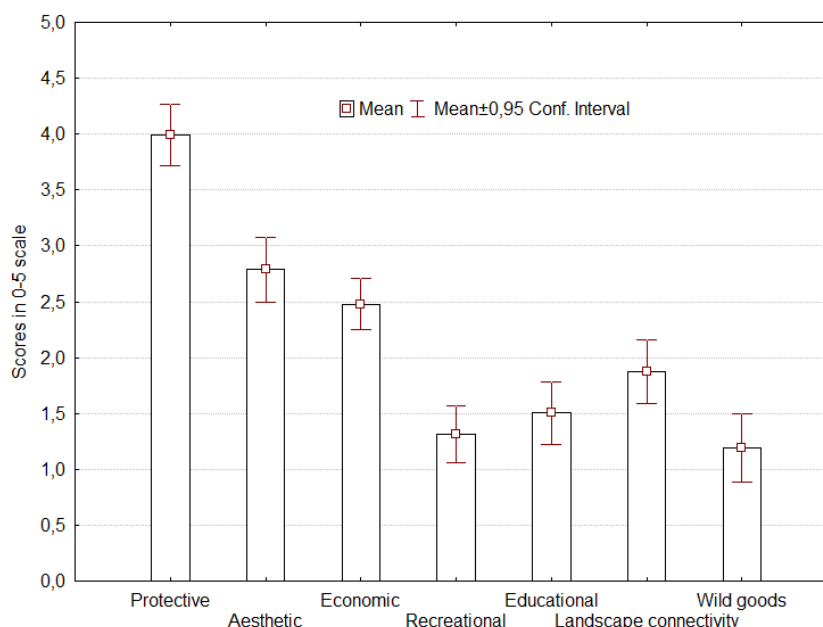


Figure 4. Local society opinion about the main functions/services of railway lineside protective plantations

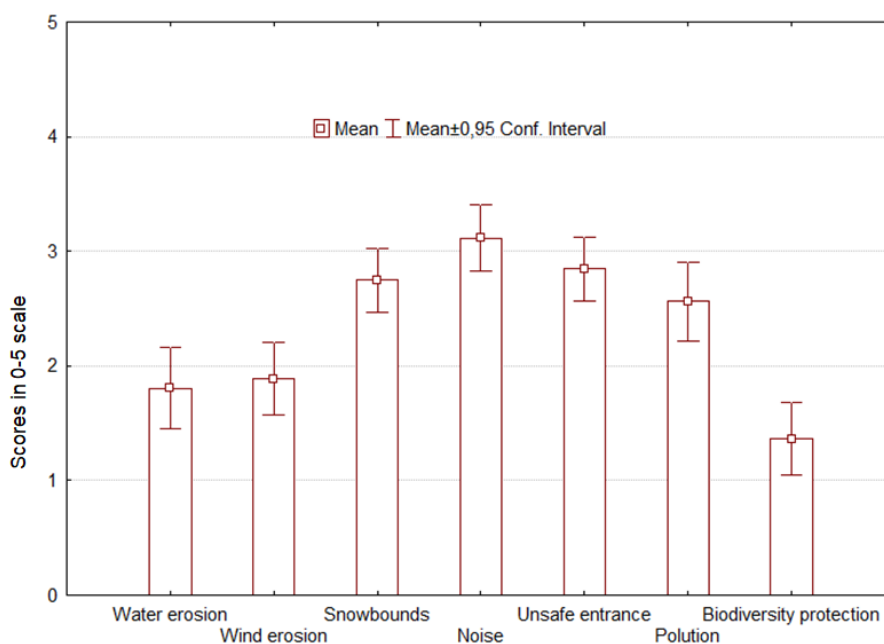


Figure 5. Local society opinion about railway lineside vegetation protective services

Since Soviet time the opinion of the society about protective plantations services is changing – from the predominating in the past service to protect railway traffic against the snow to have safer, qualitative living surrounding (Fig. 5).

The average of the score of the effectiveness of railway lineside protective plantations functions obtained just 2,8 (in 5 scale grade). This could be explained by lack of protective plantations or the design/structure of protective plantations does not suit the expected functions. About the 44% of respondents see the need of more new protective plantations along railways. Evaluation of the maintenance level of railway lineside vegetation obtained just 2,7 (in 5 scale grade). Just the removal of dangerous trees in time has got the higher local society evaluation (Fig. 6).

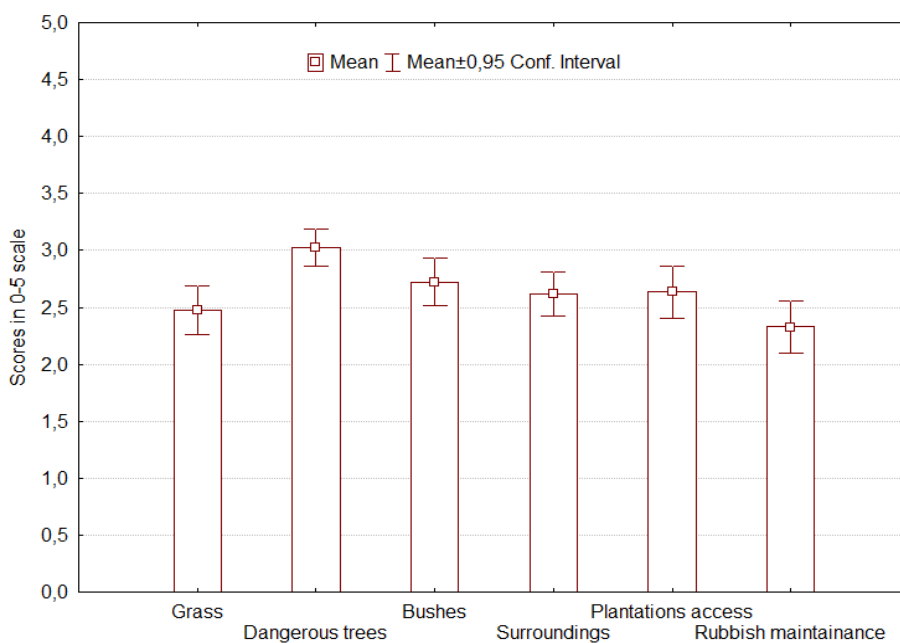


Figure 6. The local society evaluation of the maintenance level of protective lineside vegetation

Naturally the challenge could be raised to improve the image for state land manager. The main issues in neighbourhood (railway traffic in general and lineside vegetation management particularly) local society name noise and unmaintenance related with the threat of ticks, litter accumulation, weeds spread into agricultural fields, yards because of unmoved grassland (Fig. 7).

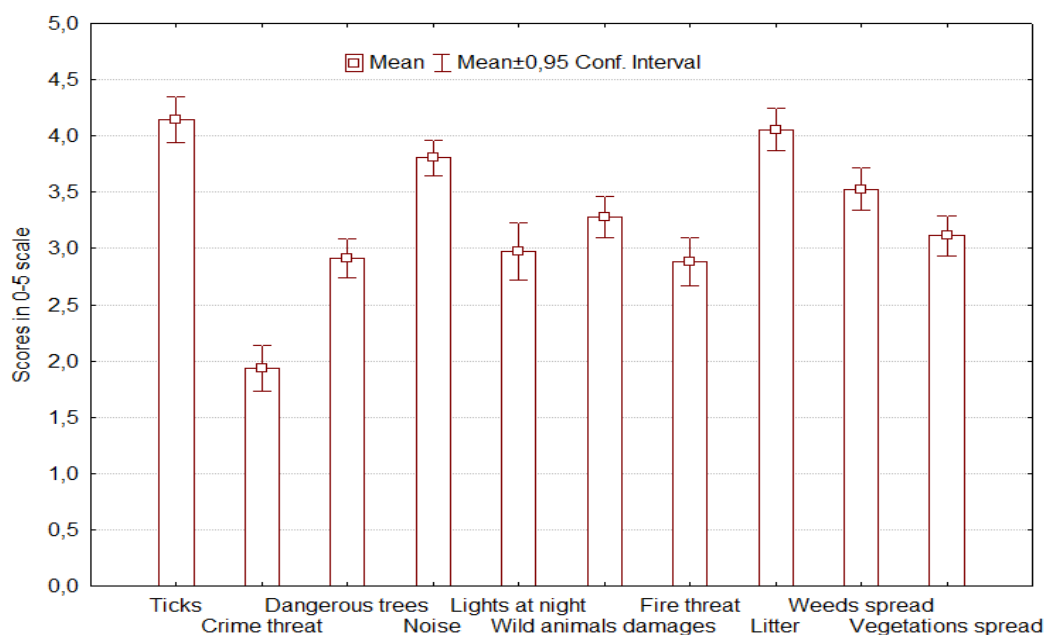


Figure 7. The main problems related to railway traffic and lineside vegetation maintenance

The importance of protective lineside vegetation along railways for local society was also checked during the social survey by the society interest in participation in lineside vegetation management in neighbourhood. „Willingness to pay“ question showed that about 50% of respondents are willing to pay (2-10 Eur per year) for well-maintained vegetation in neighbourhood. 69% of respondents pointed that no information about railway protective plantations available for local society. Just 36% of respondents know address to inform about lineside railway vegetation issues that is essential to involve the local people in detecting dangerous tree for railway traffic.

CONCLUSIONS

About the half of local society is concerned about their “neighbour” - railway vegetation. The local society recognizes the multifunctional services and need of protective plantations along railways, but the plantations should be maintained. Owning by state quite wide protective plantations allow integrated management of those plantations network by ensuring rail traffic safety and mitigating railway impact. From other hand, owning quite wide protective plantations obligate the SC „Lithuanian Railways“ to transit from separate dangerous tree removal into complex management of lineside vegetation to ensure continuous multifunctions, or, maybe, share responsibility with state forest company, private initiatives.

ACKNOWLEDGEMENTS

The work has been done within the frame of research work ordered by JSC Railway Environment Protection Centre: „The conception of establishment and maintenance of protective lineside vegetation along railways”. 2015-2016. No SP(6AC)-235. Thanks for student Rugile Simulyte for carrying out questionnaire among local people.

REFERENCES

1. Armolaitis, K., Bartkevicius, E., Juodvalkis, A., Navasaitis, M., Riepsas, E. 2003. The recommendations of management and establishment of lineside protective plantations along railways. Kaunas Akademija: LZUU. LZUU Publishing centre, 90 p. [In Lithuanian]
2. COMMIN. 2017. National Planning Systems: Lithuania. Available at: <http://commin.org/en/planning-systems/national-planning-systems/lithuania/1.-planning-system-in-general/1.5-main-elements-1.6-main-instruments-of-implementation.html> (Accessed on 14/11/2017)
3. CP Rail. 2015. Integrated vegetation management plan. Pest management reference number CP01122014. Available at <http://www.cpr.ca/en/community-site/Documents/CP-IVMP-2015-BC.pdf> (Accessed on 10/10/2017)
4. Grahn, P., Stigsdotter, U. A. 2003. Landscape planning and stress. *Urban Forestry and Urban Green*, Vol. 2, pp. 001–018
5. Jaren, V., Anderson, R., Ulleberg, M., Pedersen, P. H., Wisht, B. 1991. Moose-train collisions: the effects of vegetation removal with a cost-benefit analysis. *Alces* vol. 27, 93-99
6. Kavaliauskas, P. 1994. Land Management in Lithuania: past and Future. *Geojournal*, Vol. 33.1, pp. 97–106. Available at: <https://link.springer.com/content/pdf/10.1007/BF00810141.pdf>
7. Ministry of Transport and Communications of Lithuania Republic. 2017. Railway transport. Available at: <http://sumin.lrv.lt/en/sector-activities/railway-transport-1> (Accessed on 14/10/2017)

8. Network Rail. 2017. Lineside neighbours. Available at: <https://www.networkrail.co.uk/communities/lineside-neighbours/> (Accessed on 10/03/2017)
9. Official statistics portal. 2017. Geospatial data of the 2011 Population and Housing Census of the Republic of Lithuania. Available at: <https://osp.stat.gov.lt/en/gis-duomenys> (Accessed on 11/11/2016)
10. SBB CFF FFS. 2010. Available at https://www.sbb.ch/content/dam/sbb/de/pdf/sbb-konzern/ueber-die-sbb/projekte/R_I-20025_DE.pdf (Accessed on 11/10/2017)
11. The International Workshop “Weed control on Railways: What future for herbicides?”. 2016. *2nd UIC International Workshop on Vegetation Management 24 and 25 May 2016 at UIC headquarters, Paris*. Available at <https://events.uic.org/2nd-uic-international-workshop-on-vegetation-management> (Accessed on 10/09/2017)
12. Trafikverket. 2017. Hur vi genomför träsäkringen. Available at <https://www.trafikverket.se/resa-och-trafik/underhall-av-vag-och-jarnvag/Sa-skoter-vi-jarnvagar/Tradsakra-jarnvagar/Hur-vi-genomfor-tradsakringen/> (Accessed on 11/10/2017)
13. Victorian Rail Industry Environmental Forum. 2007. Vegetation management guidelines for rail corridors. Available at <https://www.yumpu.com/en/document/view/11799493/vegetation-management-guidelines-for-rail-corridors-victrack/5> (Accessed on 12/07/2016)