

Project Update: September 2016

Reporting Period July-September 2016

This report is an update of the data collection period running from July – September 2016 in Ol Pejeta Conservancy (OPC) Laikipia, Kenya during this period. This project focused chiefly on understanding vegetation types in Ol Pejeta Conservancy for the purposes of examining spatial and temporal changes of the landscape.

Mapping of the vegetation cover started with manual tracking of the various patches in OPC under different vegetation types as at the year 2016 using GPS. Here, a vehicle was used to cruise around those patches and finally data downloaded and converted into readable formats by use of GIS and remote sensing software. This was necessary to familiarise with various vegetation classes in different locations and to minimise mix up (misclassification) while digitising the same in Google Earth software. After mapping various vegetation types, the other activity was to examine the dynamics of vegetation over time. Landsat Images downloaded from the USGS Website were also used for the purpose of examining encroachment by *Euclea divinorum* for the study period between 1987 to 2016.

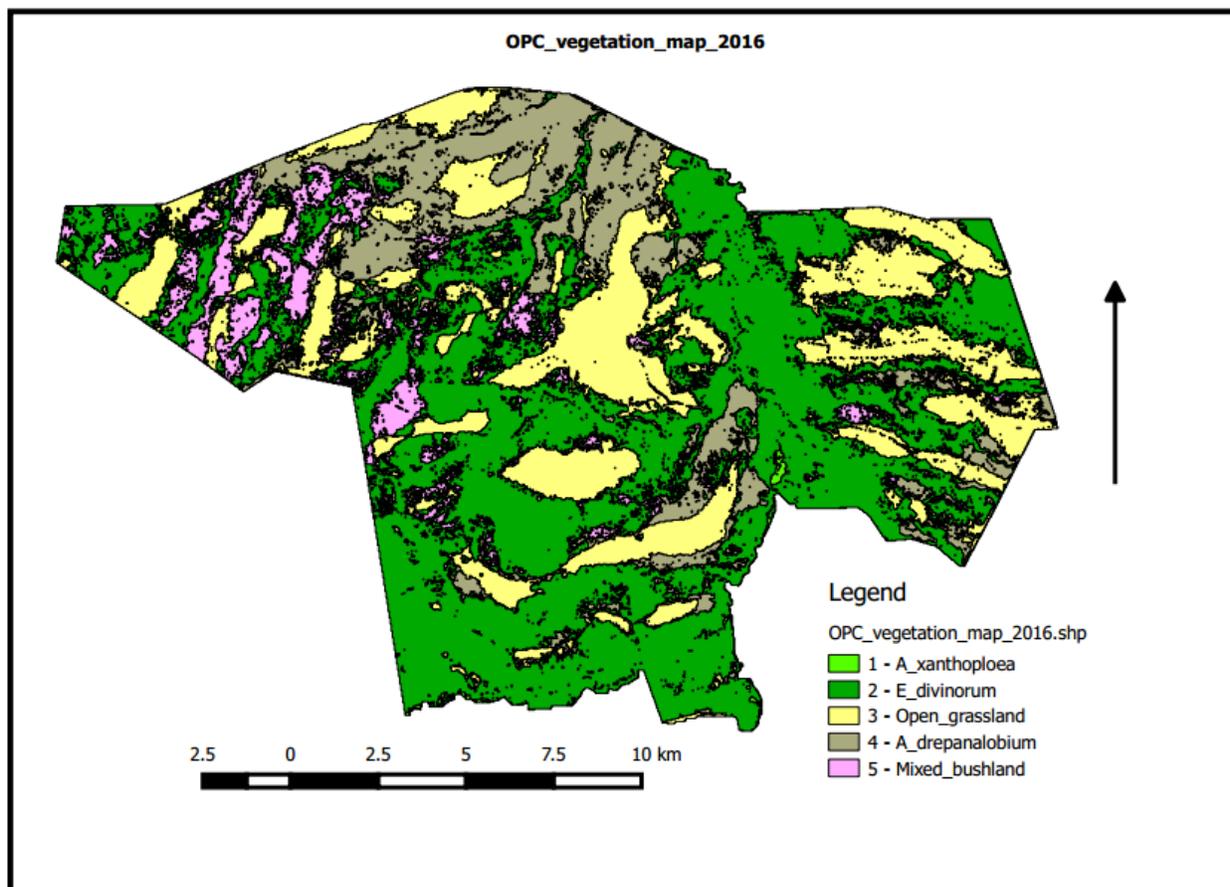
Pre-processing of remote sensing data

The required pre-processing of remote sensing data were performed to enhance image quality. This included processes such as re-projection to preferred Universal Traverse Mercator (UTM), Top of Atmosphere Reflectance (TOA) using Dark Object Subtraction 1 (DOS1) and consequently image classification and accuracy assessment.

Preliminary results

Vegetation map of OPC

Landsat image 2016 was analysed and produced the five major land cover types of focus which include *A. xanhophloea*, *E. divinorum*, open grassland, *A. drepanalobium*, and mixed bushland. These vegetation land cover types are in the following proportions *A. xanhophloea* 85.45 ha (0.29%), *E. divinorum* 14455.98 ha (49.65%), open grassland 7051.69 ha (24.22%), *A. drepanalobium* 4950.32 ha (17.00%) and mixed bushland 2573.97 ha (8.84%).



Vegetation map of Ol Pejeta Conservancy derived from Landsat 8ETM+ 2016 vegetation classification results

Land Cover Changes with Reference to *E. divinorum*

Multispectral Landsat images TM and ETM+ of 1987, 1995, 2000 and 2016 were used to study land cover dynamics with more focus on changes in *E. divinorum* as the species of concern for this study. Here, images were classified into five major land cover types that dominate OPC vegetation classes. These classes include open grassland, *A. drepanolobium*, *E. divinorum*, mixed bushland and *A. xanthoploea* a riverine vegetation however, in some images more classes were identified such as swamps and water bodies (with insignificant cover) which came to existence as a function of human intervention to provide more water for animals recently.

The table below shows *E. divinorum* cover in different year that images were classified

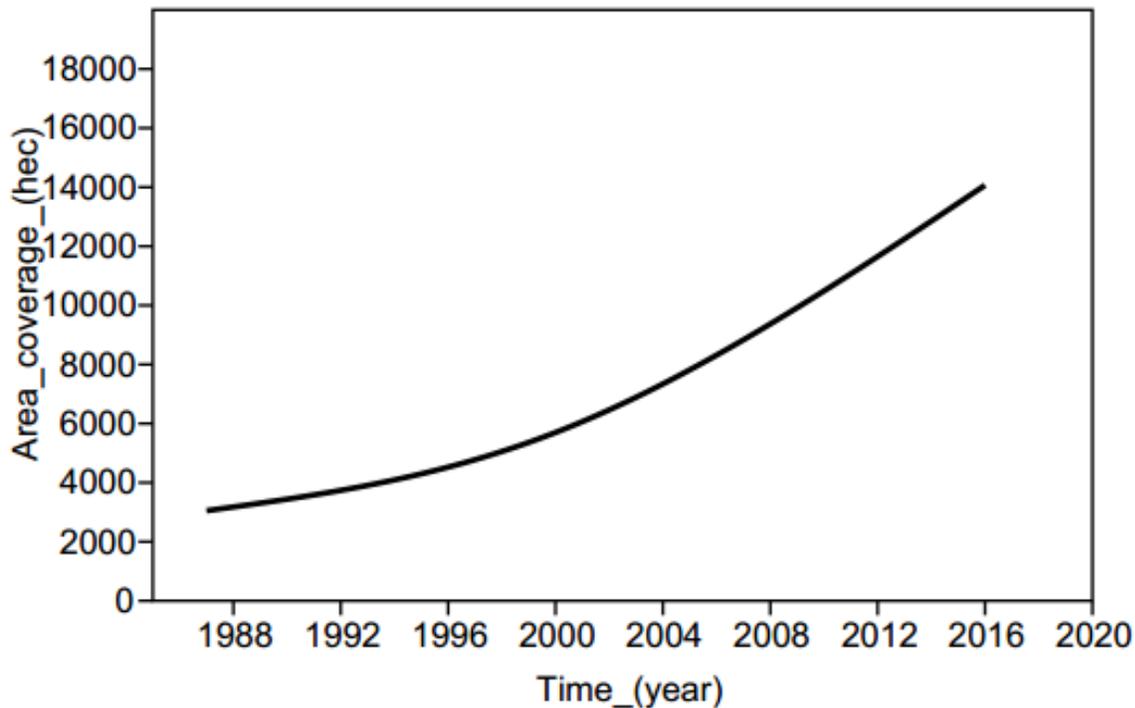
Table 2: proportions of *E. divinorum* changes for the study period

Year/ class	1987 (hec)	1995 (hec)	2000 (hec)	2016 (hec)	Δ cover 87-95	Δ cover 95-00	Δ cover 00-16	Over all Δ cover 87- 16
<i>E. divinorum</i>	3595.2 0	4126.6 3	4933.5 0	14455.9 8	+531.4 3	+806.8 7	+9522.4 8	+10860.7 8

Key (+ve) denotes increase in coverage while (-ve) implies decrease in vegetation cover

From the table above, between the year(s) 1987 and 1995 there was increase in cover area by about 531.43 ha whilst between years(s) 1995-2000 and 2000-2016 there was increase in coverage area in 806.87 and 9522.48 ha respectively.

Graphical representation of *E. divinorum* cover changes as from year 1987 to year 2016. Here, it is shown that cover for the species in question increased gradually between 1987 to 2000 and followed by drastic increase in the following years of monitoring by 2016.



Changes in *E. divinorum* class cover in the entire study period 1987-2016

The rate of change between 1987 and 1995 annually was 66.42 ha/yr (increment) whilst annual increment rate between 1995-2000 and 2000-2016 were at 161.374 ha and 595.155 ha respectively.

Over all Land Cover Changes on OPC

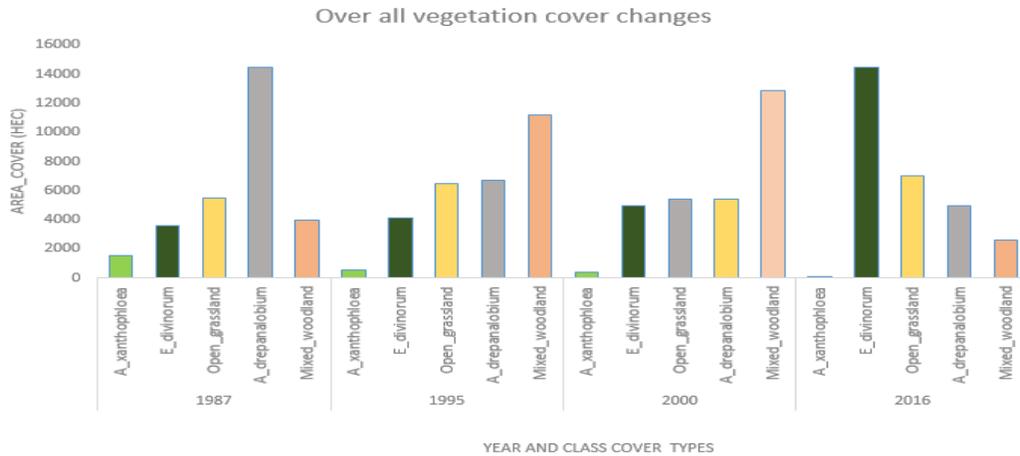
It was evident from the study that, some land cover classes have continuously increased in cover while others had showed decrease between the first 2 years and increased in cover in the subsequent years. Further, the land cover class of riverine *A. xanthophloea* was nearly completely lost <1% cover by the year 2016.

Proportions of land cover classes and changes for the study period

Year/ class	1987 (ha)	1995 (ha)	2000 (ha)	2016 (ha)	Δ cover 87-95	Δ cover 95-00	Δ cover 00-16	Over all Δ cover 87-16
<i>E. divinorum</i>	3595.20	4126.63	4933.50	14455.98	+531.43	+806.87	+9522.48	+10860.78
Open Grassland	5493.00	6518.63	5452.16	7051.68	+1025.63	-1060.47	+1599.52	+1558.68
<i>A. drepanalobium</i>	14478.83	6723.63	5421.49	4950.32	-7755.2	-1302.14	-471.17	-9528.51
Mixed bushland	4003.67	11188.30	12879.84	2573.97	+7184.7	+1691.54	-10305.87	-1429.73
<i>A.xanthophloea</i>	1546.72	560.22	430.42	85.45	-986.50	-129.80	-345.27	-1461.27

Key (+ve) denotes increase in land cover while -ve denote decrease in land cover

From the exploratory land cover changes in the table 3 above, it's evident that land cover changes are quite dynamic in the sense that there is increase or decrease in certain land cover classes or continuous decrease/increase in class cover. Particularly, *E. divinorum* has increased in cover throughout the study period where as *A. drepanalobium* and *A. xanthophloea* have decreased in cover over time throughout. On the other hand, open grassland, and mixed bushland have neither increased nor decreased in cover in different study periods. Open grassland class, between 1987- 1995 there was increase in cover (+1025.63 ha) followed by a decrease between 1995 and 2000 by (-1060.47 ha) and an increase in between 2000-2016 by (+1599.52). Overall there was increase in open grass cover from the entire study period (1987-2016) by +1558.68 ha. Another class cover under consideration is the mixed bushland, here there was increase in cover between 1987-1995 and 1995-2000 by 7184.7 ha and 1691.54 ha respectively followed by decrease from 2000-2016 by 10305.87 ha. However, there was an overall decrease in class cover in the entire study period by 1429.73 ha.



OPC vegetation class cover changes and trends from 1987 – 2016

Camera trap deployment for diversity survey

Infra-red camera traps have been deployed and the session is nearly completion. In late October 2016, data cleaning and further analysis will begin. Preliminary results will be reported in the subsequent quarter.

Conclusion

From the preliminary results its evident that *E. divinorum* has been increasing in cover over time whilst, *A. drepanalobium* has been decreasing in cover which can potentially affect resource base for black rhino and elephants in the long run hence affecting the conservancy carrying capacity.