The surplus-value of a long-standing monitoring program for visitor management in the Meijendel Dunes, a recreation and protected nature area

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Keywords: Traffic management; Long-term visitation; Leisure; Parking; Cycling;

We show the value of a long-standing baseline visitor monitoring program in The Meijendel Dunes (Fig. 1), an area with large day-by-day fluctuations (Beunen et al., 2004). The area is situated directly north of The Hague (450.000 inhabitants) and covers roughly 2000 ha. It is important for nature conservation, leisure activities, drinking water production and sea defence. The Valley in its centre (180 ha) has great nature values. With 25 km of footpaths and 6 km of bicycle paths this is also the most important place for leisure activities.

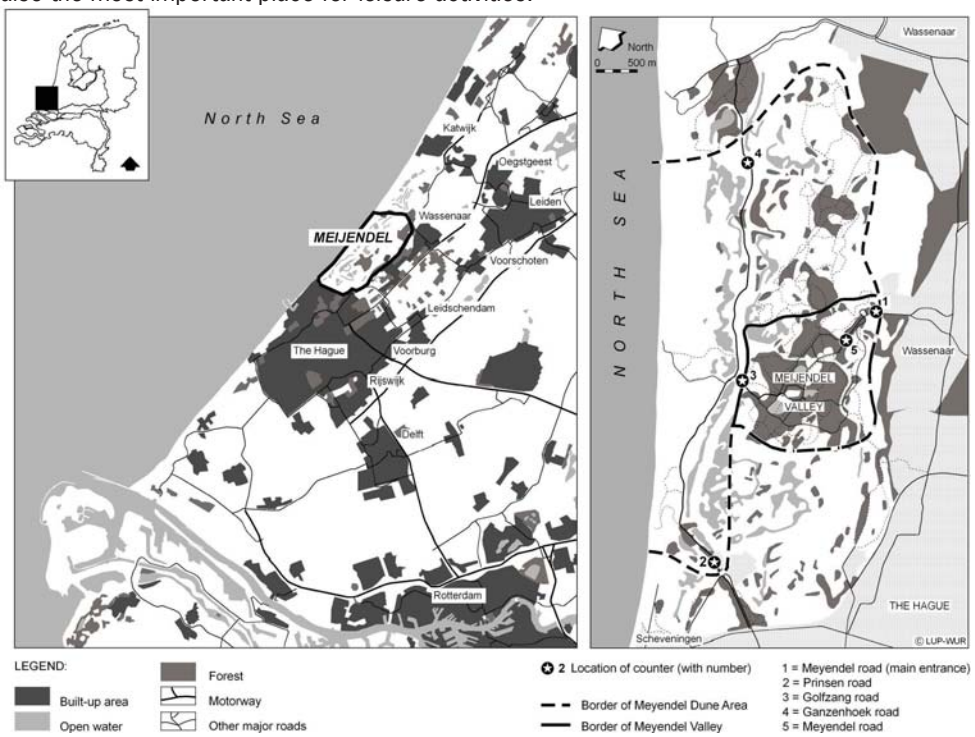

Figure 1. The Meijendel Dune Area with the Meijendel Valley in its centre (Beunen et al., 2004). Left panel: Location and surroundings near the city of The Hague, The Netherlands. Right panel: Counting locations; site 6 was added in the south-east of the Valley after the opening of a new bicycle path in 2007.

The main entrance can be used by cars as well as bicycles (location 1). Cyclists can also enter the Dunes from the north and the south (locations 2 and 4) and the Valley from the west (location 3). There are two car-parks: in the centre of the valley and close to the entrance (between location 1 and 5).

Methods applied

Daily counts on all entrances of the number of cars and bicycles with automatic devices and a pressure-sensitive tube across the road were the basis of the visitor monitoring. Visual sampling is used to calibrate these daily data and to estimate the number of pedestrians.

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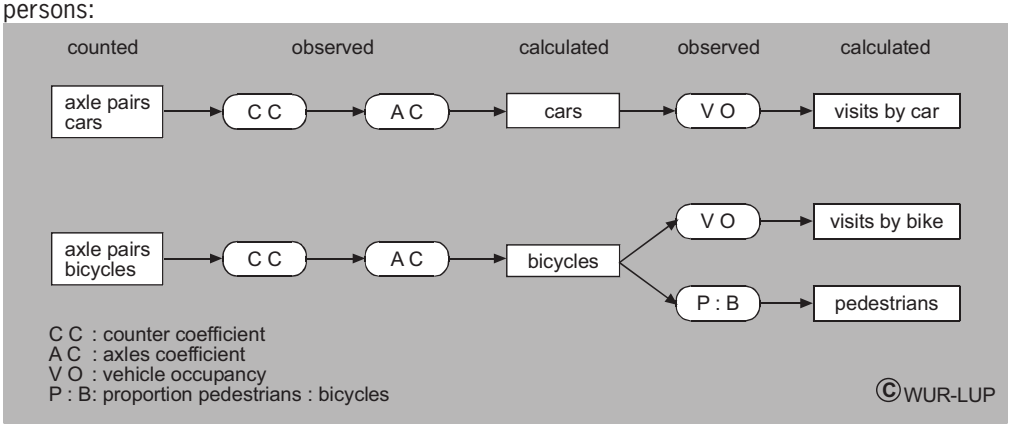
The scheme shows how the number of vehicle-axles was re-calculated into the number of visiting persons:



applying a counter-coefficient (to correct for inaccuracies made by the detector), an axles-coefficient (to correct for multiple axes), and, last but not least, the vehicle occupancy.

According to de Bruin et al. (1988), 12 types of days have been distinguished (4 seasons; weekdays, Saturday and Sunday). Visual counts were executed during 1992-1996 in each season and in total on 2 weekdays, 3 Saturdays and 3 Sundays. The classification into 12 could then be reviewed into 8 types, based on small differences in the averages for similar days of the week in some sequential seasons. In 2002 an update of the visual counts on location 1 was made, followed by an integral update in 2009/2010.

Results (Fig. 2)

The annual number of visitors varies between 960,000 (1994) and 807,400 (1998), with an average of 893,500. The average modal split is 53% by bicycle (range 50-57%), 44% by car (40-48%) and 3% on foot.

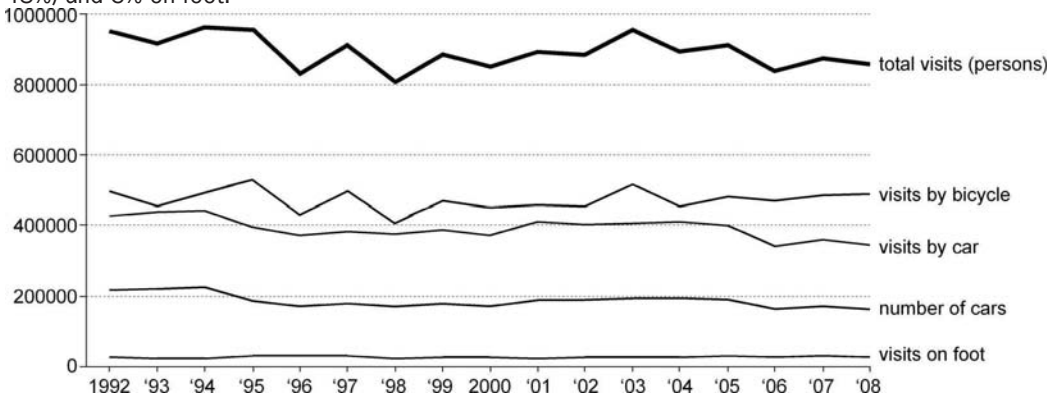


Figure 2. Overview of annual visits (total and separated by mode: car, bicycle and on foot) and annual number of cars in the Meijendel Dunes; 1992 - 2008.

The relationship between these counting results and parking policy measures is interesting. A capacity reduction in the Valley in 1995 resulted in a decrease of 40,000 cars per year. A smaller extension of the parking at the entrance in 2000 was followed by an increase of about 20,000 cars. The shift in parking places has led to less cars driving into the Valley (Beunen et al., 2006).

The monitoring program also proved to be useful for evaluation of several other management measures, such as regulations in 1995 that made compulsory the use of leashes for dogs and the closure in 1997 of a jumping-off place for horses in the Valley (Jaarsma et al., 2003).

Discussion

Our experiences with long-standing monitoring confirm the statement "Better data collection is an important step to better funding, management and allocation of natural resources to recreation" (Loomis, 2000: 95). And even more so: our data also enabled us to evaluate the impacts of specific management measures in a multi-functional area and so to render account of disputed measures.

"Relevant, practice oriented and reproducible data is required to enable leisure and recreational planning. This data must: be easily interpretable, permit simple further digital processing, be principally quantitative and result from continuous and simple data collection" (Brandenburg & Ploner, 2002: 171). Our results show how simple automatic axle counters can provide the backbone of such data, to be transformed into vehicles and visitors with a deliberated sample of visual counts. After an analysis of relationships between site-observations during a number of years, a continuation with a reduced number of sites and types of day proved to be possible.

From the long-term observations we conclude that there is a decrease of visits by car, and, 'hidden' within considerable year-to-year fluctuations, a slight increase for visits on bicycle. Because no specific management measures for bicycles were taken, weather conditions are thought to be an explaining factor (Hendriks, 2002; Thomas et al., 2009). This needs further research, however.

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Monitoring and modelling of visitor use on access land across Rombalds Moor, Ilkley, England

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Keywords: visitor, monitoring, modelling, access, assessment, landscape

The Countryside and Rights of Way (CROW) Act 2000 created a new right of open access to mountain, moor, heath and down, in 2004/05. Over half of mapped access land in England is nationally designated as a site of special scientific interest (SSSI) or as a Natura 2000 site. An access assessment was carried out in line with Habitat Regulations (1994) on Rombalds Moor in 2004 (Natural England, 2009) using the Predictive Site Use Model (Thurston & Taylor 2002) to understand changes in access use to pre-empt and manage potential impacts on biodiversity from the new rights, using statutory restrictions and positive access management (PAM) techniques.

The aim is to test the predictive power of the model by ground truthing with spatial visitor data from the Open Access National Visitor Survey (OANVS) collected across Rombalds Moor between 2005 and 2007 (Johnson *et al.* 2009a). The main objectives were to determine the model accuracy, assess its ability to accept visitor data, understand if this improves accuracy and test the potential in assessing the relationship between upland bird trends and changes in access use, in conjunction with the annual Upland Breeding Bird Survey (UBBS) (Noble *et al.* 2007 & 2008).

The method was designed to compare dataset 1: predictive, and dataset 2: actual, gathered on the levels and patterns of access use across Rombalds Moor. Dataset 1 was gathered using the spatial access assessment method (Natural England, 2009) to assess the change in use on access land pre-CROW, in 2004. Dataset 2 was collected via interview and observation methods to monitor visitor usage post-CROW between 2005 and 2007, through the OANVS survey. Dataset 1 and 2 were modelled producing a predictive and actual model, using the Predictive Site Use Model.

The model produces a GIS output that identifies high, medium, low change in use across a site (Fig: 21) producing a simplified picture of change in access use to aid decision making in developing the appropriate management. The distribution of visitors on foot are influenced by points of entry, relative landscape attractiveness of different areas, topography, variations in the distance (a distance decay mechanism was developed) and patterns people will travel from their point of entry (Thurston et al. 2002).

Additional site factors or predictors of change was also gathered: location and capacity of entry points onto the site, unmarked routes/desire lines, unusual features of interest (e.g. crashed aircraft, archaeological sites), and site-specific factors that are likely to influence visitor behaviour such as attractive landscape features, e.g. waterfalls, reservoirs and detractors e.g. blanket bog (Thurston *et al.* 2002, Keane *et al.* 2008).

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