South African Journal for Research in Sport, Physical Education and Recreation, 2012, 34(2): 197-214.
Suid-Afrikaanse Tydskrif vir Navorsing in Sport, Liggaamlike Opvoedkunde en Ontspanning, 2012, 34(2): 197-214.
ISBN: 0379-9069

LOCATING OPPORTUNITIES FOR OUTDOOR ACTION AND ADVENTURE RECREATION AND TOURISM IN THE WESTERN CAPE: A GIS APPLICATION

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ABSTRACT

This paper indicates how modern spatial computing technology can be used for developing spatial policy for, and planning of outdoor action and adventure recreation and tourism (OAART). An application was performed in the Western Cape Province of South Africa. The research overviews spatial recreation and tourism development policy, marketing and express outdoor recreationist and tourist preferences that translate into spatial suitability indicators or attraction features captured in a spatial resource database. Special attention was given to the conceptual foundations of attraction and what can be captured in spatial format as mapped variables. The methodological approach of spatial multiple criteria evaluation (MCE) by weighted linear combination of spatial factor layers as images in a geographical information system (GIS) are explained. The outcome in map format demonstrates the execution of the technique for the Western Cape. The fine-scale spatial result was compared with the coarser regional indicators of the marketing-based spatial development framework proposed to guide official recreation and tourism planning. The results are useful for entrepreneurial and regulatory planning and may be replicated in different spatial locations provided a supporting database exists.

Key words: Geographical Information System (GIS); Multiple Criteria Evaluation (MCE); Action and adventure recreation; Nature tourism; Spatial planning; Western Cape Province.

INTRODUCTION

As societies develop, economies mature and people globally become more affluent, live longer and have more spare time, while outdoor recreation and tourism become increasingly important activities. Conceptually, a confluence between outdoor, nature-based action recreation and similar types of tourism has become evident. Issues like policy formulation, activity promotion and resource development, especially at strategic regional and local spatial resolutions, resonate strongly. Spatial planning by authorities and entrepreneurs has consumer needs, demands and trends in tourism and recreation preferences as its drivers. Hence, Bell *et al*. (2007) prioritise research needs in this field, firstly as monitoring and assessing resource demands (recreation behaviour, activity preferences, new technologies), impacts (climate change, natural and social vulnerability), site-specific resource pressures (resource characteristics, visitor numbers, carrying capacity, conflicting uses) and, secondly as planning for new developments and alternatives (sustainable usage, strategies for regions and communities, building efficient resource databases, new technologies to support decision making).

This paper draws direct and important parallels between the fields of outdoor recreation and nature-based tourism. Tourism, as major generator of revenue and employment opportunity, receives prominent attention from government policy development and implementation, as well as entrepreneurial investment, while recreation is often treated separately in the public domain and as being less directly valuable to society. Yet, the same resource base is exploited by both activity sectors in largely the same manner and for similar reasons. Should the simple definition of recreation as 'active, enjoyable leisure activity' (Kent, 2006; Ndulini, 2009) be embraced, the parallel with 'nature based tourism' (activities that take place in a nature area and are directly or indirectly dependent on or enhanced by the natural environment) (Tangeland & Aas, 2011:823), is self-evident, in spite of the fact that definitions have been much refined for specific analytical or management purposes (Hammitt, 2004; Mnguni, 2010; Tangeland, 2011).

In this paper, outdoor, nature-based recreation and nature tourism and derivatives of both are synonymous and called 'outdoor action and adventure recreation and tourism' (for the sake of brevity referred to as OAART throughout) to avoid confusion. OAART represents an efficient means to extract economic value from localised tangible and intangible environmental resources of cultural and natural origin and hence demands proper planning at strategic spatial and localised entrepreneurial levels.

The Western Cape is a premier tourism destination with its development potential strongly linked to a rich natural and cultural resource base, well-developed tourism infrastructure and its Big Six attractions (Table Mountain, Cape Point, Kirstenbosch, Groot Constantia, Victoria and Alfred Waterfront, Robben Island). Yet, provincial space is unevenly endowed with natural and human resources ranging from lush coastal plains and mountain valleys studded with large urban concentrations to bleak, dry and desolate inland plains. The geographic complexity and diversity of situated resources (Olson, 2010), as products of their biophysical properties and the political, social and economic framework, in which they are produced, provide the province with an extraordinarily rich resource base for current and future development of OAART.

Successful OAART at any locality must satisfy visitor experiences, enhance the quality of life of local populations and protect the local natural, built and cultural resource bases. Such an approach recognises the importance of a sound spatial framework for planning and developing a sustainable OAART industry in local and national space (Boers & Cottrell, 2007; Marcouiller *et al*., 2009; Kanga *et al*., 2011) so that regions become destinations on their own. Yet, evidence shows scant theoretical and practical concern for the incorporation of spatial planning principles in the design of development policy and for the direction of development funding to follow resource evaluation and targeted investment. This paper addresses this dilemma through a practical application of spatial information technology.

RESEARCH APPROACH, PLAN AND METHODS

The paper aims to show how modern spatial computing technology can operationalise the tourism development policy in the Western Cape Province of South Africa. An overview of provincial policy, the tourism marketing framework, the OAART resource base and the methodological approach of spatial multiple criteria evaluation (MCE) and its application in a geographical information system (GIS) for the Western Cape are provided. This prototype application, it is argued, is replicable for similar spatial units elsewhere in South Africa or indeed internationally.

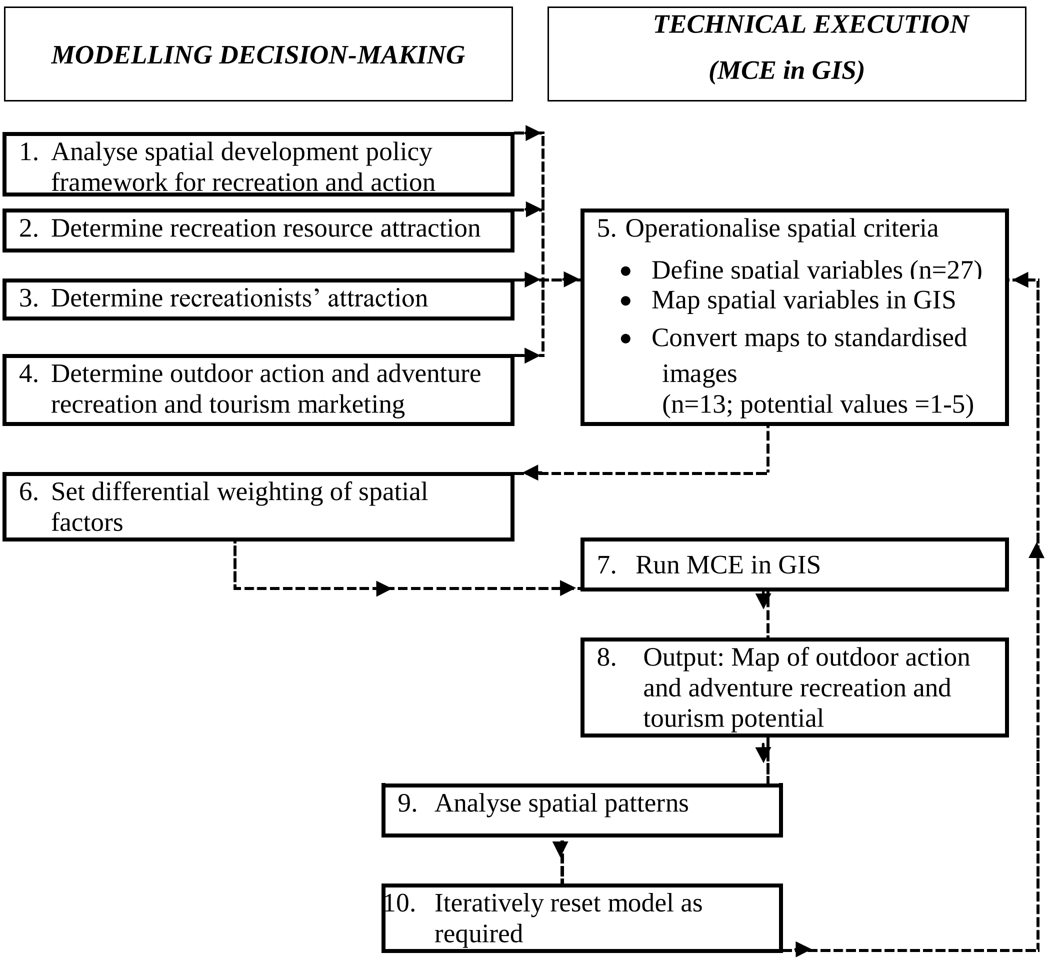

FIGURE 1: **RESEARCH STEPS OF MCE MODEL BUILDING**

The paper explains the spatial MCE approach in the ten sequential research steps shown in Figure 1, namely interpret spatial development policies, determine spatial attraction factors from various perspectives, select spatial variables, map them, apply digital conversion and standardisation and factor weighting, followed by MCE application and interpretation of the spatial outcome, and finally iterative revision if required. Later sections in the paper elaborate on these steps as they were performed.

The empirical content of the paper is based on research conducted for Cape Town Routes Unlimited (CTRU) to identify spatial tourism gaps for development and market opportunities in the Western Cape Province (Van der Merwe *et al.*, 2008). OAART emerged as a major development opportunity among nine identified tourism market segments. A panel of experts passed judgement on the indexing method for OAART potential measurement, market segmentation and recreationists' product preferences. The destination definitions were translated to spatial operational format for the OAART product and a spatial database of phenomena and features indicative of the product's potential (natural outdoor resources and human-made plant) was portrayed as indicators of potential. Twenty-seven relevant criteria were selected from 80 available mapped variables, as a spatial data inventory of determinants for OAART opportunity and infrastructure in the Western Cape. These were employed in an application of a spatial MCE model in GIS for generating a map of OAART development potential at a spatial resolution of $1km^2$ as product.

PRINCIPLES AND PROCESSES OF MULTICRITERIA EVALUATION IN GIS

Ideally, human decision-making should weigh multiple influencing factors to reach objective, balanced and logical conclusions. This principle is realised in spatial decision-making through overlaying spatial variables (mapped phenomena) and analysing their superimposed, combined and cumulative influence. The proven cumulative or clustering effect in the attraction value of proximate recreational resources (Weidenfeld *et al.*, 2010) is harnessed in this manner. The realisation has only recently dawned that this represents the combination of the spatial manifestations of classical complex human and natural systems (Proctor & Qureshi, 2005; Kiper, 2011) that collapses different landscapes into a categorisation scheme (Olson, 2010), together with related resources. In the geoinformatics age, the method has been greatly refined and simplified in the form of MCE for application in GIS (Ascough *et al.*, 2002). This modelling methodology requires the application in a raster modelling format (as opposed to the vector format of geographical feature data captured as points, lines or polygons in GIS). The method combines criterion values (in each individual raster image cell) mathematically in a MCE module to form single potential images via the weighted linear combination formula:

$P = \Sigma W_i X_i$, where W_i = Weight of factor i, and X_i = Criterion score/cell value of factor i.

The application entailed the implementation of a stepped sequential process (Van der Merwe, 1997) is shown in Figure 1. In essence it requires that two parallel, cooperative processes be performed: the one (Steps 1-4, 6 in the diagram) is a decision-making process involving all relevant decision-making stakeholders, the other (Steps 5, 7, 8) involves the technical gathering and manipulation of spatial data and the running of the software by the GIS specialist. In this application workshop, input largely captured the former set, while data gathering, generation of distance parameters, manipulation of each variable to signify importance in the potential rating, the weighting of these variables for combination, and the eventual programmatic generation of an OAART product potential image (Step 8), were performed by a team of scientists. Because differently calibrated program runs generate different results (Heywood *et al*., 1994; Boroushaki & Malczewski, 2008), an iterative process allows revisiting the steps until results meet policy requirements. While sensitivity analysis may be required to affirm particular model outputs, the argued scientific integrity of expert calibration is deemed sufficient to guarantee valid results.

PRINCIPLE OF PROPAGATION OF SPATIAL FEATURE INFLUENCES IN GIS

The criteria used in an MCE analysis are based on spatial relationships or situation characteristics. Situation factors measure the exposure that each raster cell has to resources or land uses that generate spatial externalities for the activity being sited (Cromley & Huffman, 2006). During Step 2, distances from target features to each cell in the factor image are calculated in a standard GIS procedure. This allows the logical object-based influence or potential-generating effect of features in the landscape (Aplin & Smith, 2011) to extend beyond the immediate physical presence or footprint in that landscape. By allowing individual layers of resource elements to propagate their relative influence over tourism-potential space, both the numerical value of a feature type (denoting intensity of the phenomenon’s occurrence at a place) and the nature of the location it refers to must be factored in. This means that ‘influence distance’ is made dependent on the relative intensity (size, quality, rating) value of the target feature (Chhetri & Arrowsmith, 2008; Kanga *et al*., 2011).

When feature values denote mere presence or absence (Boolean values), the feature class exercises a linear distance effect radiating in constantly diminishing degree away from the feature. However, when features or various members thereof (line features like roads) are rated along a value range (ordinal or scale variables) the distance effect for higher-valued features or parts thereof must extend farther according to the segment value; examples being roads of different classes, or facilities with different quality or size ratings. The rate of influence decay of a feature with distance from that feature need not be constant (a linear function), but may be a logarithmic or similar function. However, this presupposes some empirical knowledge or measurement to calibrate the function. In this application all propagation of distance influence was linearly calculated and classified into equal-interval, potential-generating class values.

MCE application in GIS for spatial decision support is described as “…perhaps the most fundamental of decision support operations in geographical information systems” (Jiang & Eastman, 2000:173). Geographers and scientists from related disciplines, various geographical regions and developmental realms of the world, initially concentrated their MCE applications on determining the location suitability of various phenomena based on multiple qualifying criteria, especially regarding the natural environment (the author encountered many examples in the literature not directly relevant here).

Improving the human condition, expressed as activity preference and specifically in tourism applications, is the field where the most relevant and innovative applications for this study occur. Examples are comparing areas' options for recreation and tourism activities (Proctor & Drechsler, 2003; Kumari *et al*., 2010; Kiper, 2011) or districts' tourism performance (Smith, 1987; Kanga *et al*., 2011) of which the latter is now available in web-driven format (De Montis & Nijkamp, 2006). Such examples are evidence that MCE application is growing in sophistication and its usefulness is being widely recognised. Yet, its application for determining recreation and tourism potential for various products in the same geographical area, as attempted here, is a fresh and innovative approach.

ALLOCATING RECREATION AND TOURISM DEVELOPMENT SPACE IN THE WESTERN CAPE

Designating potential centres for recreation and tourism in provincial space is determined by government policy and by understanding the preference of market participants. The consultants, KPMG, have developed an integrated tourism development framework (ITDF) according to the initial policy foundation provided by the provincial White Paper on tourism (DEAT, 2001; 2002). This framework reviewed tourism potential (through the assessment of tourism product, plant and infrastructure, supply patterns, possible portfolios and theme routes) and matched these with the demand from primary and secondary international and domestic markets servicing the destination. This approach facilitated the identification of a formal, coarse-resolution hierarchy of spatial tourism development foci like gateways, distribution points, routes and destinations (DEAT, 2002). The plan identified 11 nodes and corridors (tourism development areas [TDAs]) worthy of further development and which offer a basis for comparison with the results of this research.

The scope of OAART as drivers for local and regional economic development across South Africa is maximised through appropriate policy interventions designed to support the competitive niches in local tourism economies. Therefore, the Western Cape is informed by the wider international experience (Baum, 1998; Butler& Waldbrook, 2003; Rogerson, 2004, 2007) in planning the development of OAART, especially the territorially based product (Che *et al*., 2005). The Western Cape province is endeavouring to grow its tourism product portfolio farther afield from the Cape Town metropolitan area and the highly developed southern coastal region. This raises the pivotal questions: To where should government and industry direct tourism development in the Western Cape province and, spatially and product sector-wise, where can and should OAART help to sustainably diversify the total product development load? Understanding the tourism landscape means knowing where the strength of a product is located and what the existing and future market requirements are according to recreationists' preferences.

The spatial resource base for OAART is not a monotypical phenomenon since it encompasses a variety of participant, educational and spectator experiences (Tangeland, 2011). These include OAART activities (fishing, swimming, canoeing, kayaking, rafting, boating, kiting, surfing, hiking, canyoning, mountain climbing, bouldering, caving, cycling, horse riding, bird watching, wildlife viewing, nature and action photography, fauna and flora study) and hospitality services (farm stays, country-style accommodation, restaurants sourcing local produce).

Market intelligence regarding preferences was gained through empirical surveys of OAART practitioner preferences in the Western Cape (Linde, 2001; Speirs, 2003; Donaldson, 2007) and standard statistical sources (DEAT, DTI, SAT, 2005; South African Tourism (SAT), 2007a, 2007b; South African Tourism Strategic Research Unit (SATSRU), 2007; WTTC & Accenture, 2007). These sources confirmed the prominent position of the Western Cape in the international tourism market and among its competitor destinations for natural beauty, wildlife and culture (DEAT, 2002, 2007). In the minds of consumers globally, South Africa's profile as a destination attraction is much the same as it was two decades ago, namely an adventure and wildlife destination with striking natural beauty (South African Tourism [SAT], 2007a).

The tourism growth strategy (SAT, 2007a) identified three segments of varying strategic significance, namely established, emerging and untapped markets. Opportunities exist for growing several of these segments in OAART and these have already been identified. Particular interest should be directed at the active sections of these segments to match the dominant nature-based products typical of the Western Cape. In summary, consumer preferences or linking-recreational-product-to-market analyses show most product development takes place around the natural resource base, the cultural product, family product and affordable attractions (SAT, 2007a).

A workshop attended by a select group of tourism experts (Vander Merwe *et al*., 2008) reached consensus on product guidance. It confirmed, *inter alia*, that innovative tourism experiences need to replace stale products; resources have an uneven spatial spread across the province; sustainable business ventures should ensure better visitor experiences and overall competitive edge of destinations; sustainability and ecological stability should be enhanced; local opportunities outside traditional tourist centres must help to reduce tourism's ecological footprint; spatial databases must be as exhaustive as possible; and tourism-resource potential is measurable in spatial map overlays. The workshop determined that rural OAART is a priority focus product among nine for the Western Cape. It also concurred with SAT (2007a) that the development of new destinations for tourism, in areas beyond the traditional tourism routes and nodes, must be pursued if OAART is to have a significant effect on poverty and unemployment, which is another aim of this research.

CALCULATION OF REGIONAL PRODUCT POTENTIAL

Product-market match aims to balance supply of tourism products, particularly attractions and services, with targeted quality OAART destination plans in regional context (Che *et al*., 2005; Puustinen *et al*., 2009; Kiper, 2011) to encourage visitation. Statistically-defined recreation and tourist segments usually originate from designated areas, fall into specified age and gender groups, have specified education and income levels and they have preferences for what they wish to do, see and eat (Kelly, 1998). The MCE method requires the selection of spatial variables (called factors or criteria) as location attributes in provincial space to determine potential attraction. This section introduces the principles on which such variable selection is founded and concludes with a listing and discussion of the variables used in this research.

Principles for selecting spatial variables

The selection rests on the realistic assumption that the recreation and tourism potential of a spatial unit (place, location or area) is determined by three generic factors: the recreational activities or resources available at the site and in its vicinity; its accessibility; and the presence of support services. These manifest as resource factors that collate the contributing effects of the individual variables. Spatial factors are invariably considered to possess, and in recreation and tourism space, to express a specific sphere of influence (Clawson *et al*., 1960; Law, 1967; Cromley & Huffman, 2006), which encapsulates in space the measurement of the questions:

- From how far will recreationists be attracted to this destination?
- How far does the local attraction influence extend to enhance other local resources or products hereby implying a cumulative attraction effect?

The accessibility factor is expressed or interpreted as proximity to the potential incoming recreationist, so accounting for opportunity demand as a function of travel cost (Carpio *et al*., 2008). Each factor must be expressed as an attraction-factor value for its quality (a closer resource of higher quality attracts the tourist more strongly). In GIS, proximity is operationalised by calculating the distance from all locations in the experimental space to some target feature (the distance from each image grid cell to a road of a given class). The location value of any potential tourism attraction is also determined by the potential product demand for that location according to the concentration of populations of given economic classes in particular areas of provincial and national space, from where demand is generated. This niche nature-based product of the province is uniquely focussed on natural and infrastructure features to be used for action and adventure activities.

Selection of outdoor action, adventure recreation and tourism product variables

The variables selected for this product are listed in Table 1. Twenty-seven (27) individual factors were identified as criteria to measure potential for this product, mainly capturing OAART opportunities, especially those that are water based (including sport). The variables cover a range of features with intrinsic (objectively measurable) and extrinsic (largely subjectively measurable) attributes (Priskin, 2001; Carter & Bramley, 2002). Six (6) compound indexed factors have been created to reduce the number of variables to 13. In this way some overlapping influences among variables were removed while the influence of individual variables remain prevalent (Kumari *et al.*, 2010) in the final analysis (albeit less influential) and application of the MCE procedure becomes less cumbersome. Combining lowly ranked variables (7 for Factor 5) maintains thematic coherence. Four main resource dimensions capture the variation in the natural and cultural landscape, spatial accessibility and service provision in provincial space quite exhaustively compared to similar research done elsewhere (Chhetri & Arrowsmith, 2008; Arabatzis & Grigoroudis, 2010; Hall, 2011).

Standardisation of measured potential

Step 5 of the MCE process is necessary because most of the spatial data sources were accessed in the original analogue (data lists) and vector formats (maps), and therefore, had to be converted to rasterised digital images.

This step required a crucial decision to be made on the resolution (cell size) of the raster images because it implies a generalisation of data from the exact vector location description to a grid cell sequence switch that automatically causes data generalisation. A fine-scale raster (<50m) implies cumbersome and computationally intensive image sizes and an unrealistic implied level of data accuracy. A coarse-scale raster (>5km) over generalises the data, causing data loss and generating output that has little functionality for decision support. Consequently, all raster images were standardised to a 1km x 1km cell size. This means that all data are approximated to the nearest one kilometre and that all results demarcate spatial units of $1km^2$. The generated image convincingly shows that this operational decision was appropriate and practical.

The variables listed in Table 1 were measured in the indicated variable units and data types. Since a variety of measurement units are used in the source maps (slope in degrees, height in metres, distance in kilometres) it was imperative that these raw values per input image be standardised (Onosemuode & Dare, 2010), because MCE application in GIS requires all image overlays to be combined virtually and thus be expressed in the same measurement unit. Many of these factor-image variables are indicative of the graduated presence or absence of a feature, but in most cases the distance (variable-kilometre influence buffers) or interpolated density of occurrence principles have been employed. Each variable in the list has demonstrable usefulness for measuring some form of OAART potential. A standard potential-rating scale for all values in the image cells was devised; such that they correlate positively with the potential they reflect (higher values indicate greater potential for the OAART product).

Although rating scales can be applied in a number of ways, this research applied the rating scale recommended in the literature to range from 1 (lowest potential) to 5 (highest potential). This range accords with human ability to comprehensibly and consistently judge differences between sequential values. Each factor image had its original (raw) cell values reclassified according to the potential scale of 1 (very low), 2 (low), 3 (medium), 4 (high) and 5 (very high). In many cases the researchers, acting as scientists, performed an expert-based evaluation to assign scale values to the raw image values. Most values for derived distance images were statistically calculated according to quintile (mostly quintiles, five equal interval classes) or natural-breaks (Jenks, 1967) functions in the ArcMap software.

TABLE 1: **SPATIAL FACTORS FOR DETERMINING POTENTIAL OF OUTDOOR ACTION, ADVENTURE RECREATION AND TOURISM PRODUCTS**

Resource availability (quality) and measurement	**Data ***	**Attraction or opportunity relevance**	**Raw weight**
NATURAL ENVIRONMENTAL ASSETS			
1. Index of climbing activity potential			8
• Cliff line presence	B	Climbing potential, aesthetics	
• Slope (%)	S	Steep topography, action activity	
2. Index for presence of water bodies based on:			8
• Permanent water presence: distance from line-channels (m)	S	Running water: inland water action activity, aesthetics, tranquillity	
• Permanent water: distance from surface areas (m)	S	Dams, lakes, rivers: inland water activity, sport, aesthetics, tranquillity	
3. Absolute topographical height above sea-level (m)	S	Steep topography, action activity	6
4. Index for challenging coastal features based on:			6
• *Coastal morphology: distance from river estuaries (m)*	S	Coastal water activity, sport, aesthetics	
• *Coastal morphology: distance from sandy beach (m)*	S	Beach activity, sport, aesthetics	
• *Coastal morphology: distance from rocky shore (m)*	S	Rocky shore activity, sport, aesthetics	
5. Index for regional climatic character based on:			3
• *Mean monthly maximum temperature (°C, negative 5-1)*	S	General outdoor comfort	
• *Mean monthly minimum temperature (°C, negative 5-1)*	S	General outdoor comfort	
• *Mean relative humidity (%, negative 5-1)*	S	Outdoor action constraint, comfort	
• *Mean July temperature (°C, negative 5-1)*	S	Outdoor winter-activity opportunity, comfort	
• *Mean February temperature (°C, negative 5-1)*	S	Outdoor summer-activity comfort	
• *Mean annual rainfall (mm, negative 5-1)*	S	Outdoor-activity opportunity	
• *Mean number of days with frost (no, positive 1-5)*	S	Outdoor-activity comfort, duration	

TABLE 1 (cont.)

Resource availability (quality) and measurement	**Data ***	**Attraction or opportunity relevance**	**Raw weight**
CULTURAL HERITAGE RESOURCES			
6. Land cover (type)	N	Activity opportunity, diversity, interest	6
7. Nature conservation area: presence	B	Ecological activity and interest	6
8. Mountain passes and trails: presence	B	Hiking activity, cultural interest, aesthetics	5
TRANSPORTATION ACCESSIBILITY			
9. Index of road network access distances			3
• *Distance from national roads (km)*	S	National access ease: activity opportunity	
• *Distance from main gravel roads (km)*	S	Local access ease: activity opportunity	
10. Weighted distance from metropoles	S	National market demand and access	3
SUPPORT SERVICES AND PLANT			
11. Cell phone coverage	O	Communications connectivity	4
12. Distance to accommodation facilities *(density index)*	S	Travel support	4
13. Index of travel and security support services			1
• *Distance to nearest petrol service station (km)*	S	Travel support	
• *Distance to nearest dentist and doctors (km)*	S	Emergency or well-being support	
• *Distance to nearest pharmacy (km)*	S	Emergency or well-being support	
• *Distance to nearest police station (km)*	S	Emergency, safety and security support	
• *Distance to nearest restaurant (km)*	S	Travel and comfort support	

***** *Data type: N=Nominal; O=Ordinal; B=Boolean (0,1); S=Scale*

Data Sources: Chief Directorate Surveys and Mapping: 1:50 000 digital layers; Western Cape Towns Research project; Environmental Potential Atlas; Cape Nature; Centre for Geographical Analysis spatial database; South African Weather Bureau; Council for Scientific and Industrial Research; Multiple and compound indices; GIS-derived computations.

WEIGHTING OF OUTDOOR ACTION, ADVENTURE RECREATION AND TOURISM PRODUCT FACTORS

Combining potential-coded, georeferenced overlay themes in GIS requires standard combination procedures through overlaying and the use of standard mathematical operators like addition or multiplication. By implication, all variable images entered into the equation carry the same weight and contribute equally to the result. Clearly, such an approach contradicts the reality of normal decision-making where influencing factors contribute varying intensities to sway decisions (Priskin, 2001). So, Step 6 of the MCE process requires that the selected variables be differentially rated and weighted and weights assigned to participating factors as proportions summing to 1.0 (or as percentages summing to 100). The subsequent MCE process allowed for differential factor affects and cell values in the potential image still ranged between 1 and 5.

The weights were calculated according to the Saaty (1977) methodology on the basis of a reciprocal matrix in which each variable is compared to and scaled for importance relative to all other variables in the equation on a scale of 1-9 (positive and negative). The procedure calculates the weights automatically from the entered weight values and also performs a consistency check. The consistency value must be below 0.1. The weighting calculation was performed by the Canadian Conservation Institute online facility that allows the entering of values in a matrix or by a line-by-line method.

The weights derived from the method explained above generated the weight ranking of the 13 selected factors as listed in Table 2. It shows the high consistency obtained in the allocation process and no factor dominates disproportionately.

TABLE 2: **FACTOR WEIGHTS**

Factor	**Weight (%)**	**Factor**	**Weight (%)**
1. Climbing activity potential	19.9	11. Cell phone coverage	3.9
2. Index for presence of water bodies	19.9	12. Accommodation facilities	3.9
3. Absolute topographical height	9.3	5. Index regional climatic character	2.6
4. Challenging coastal features	9.3	9. Road network access	2.6
6. Land cover	9.3	10. Metropolitan access	2.6
7. Nature conservation area presence	9.3	13. Travel and security support service	1.4
8. Mountain passes and trails	6.0	*[Consistency ratio: 0.02]*	*(100.0)*

RESULTS: SPATIAL OUTCOME OF MCE APPLICATION IN GIS

The results of the MCE operation in GIS to generate a potential-rating image for the OAART product are shown in Figure 2. The map illustrates the highly nuanced and quite detailed (1-km^2 resolution) spatial pattern of potential allocation as it was determined by the selection and weighting of variable factors. The spatial pattern broadly shows the expected concentration of high potential along the high-mountain complexes, river corridors and along the coast. Since it is a nature-based product, it is not surprising that the overall pattern largely highlights the less-developed and topography-endowed parts of the province. Yet, there are significant smaller peaks of opportunity in locations that call for focussed attention.

The spatial pattern appears complex because of the inclusion of fine-detail natural resources, such as water features and land cover. High-potential demarcations stream linearly along valleys from prominent topographical features, such as mountain-and-valley chains. As expected for the product, limited urban bias is detected here, as is often the case with similar projections for other tourism products.

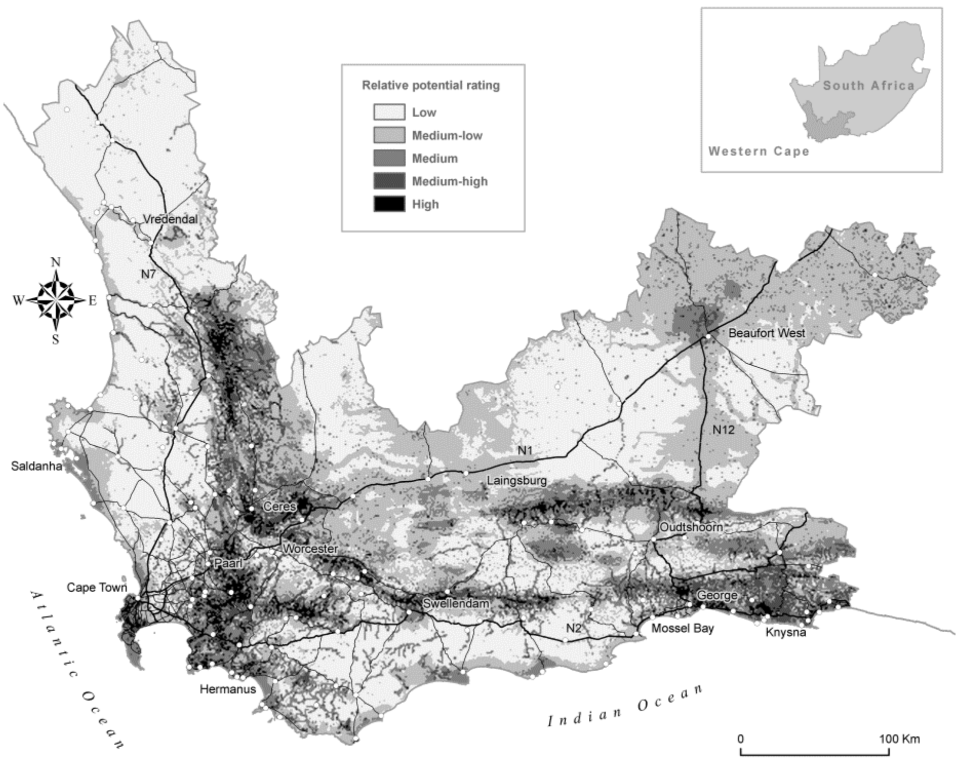

FIGURE 2:**POTENTIAL FOR OUTDOOR ACTION AND ADVENTURE RECREATION AND TOURISM PRODUCT DEVELOPMENT IN THE WESTERN CAPE**

Broadly, the Garden Route coastline and coastal bench show high prominence, with the south-western mountain-and-valley complex obtaining even higher prominence on the rating scale. The Cederberg, Swartberg, Langeberg and Boland mountain chains and eastern Little Karoo regions are clearly designated for this product. The regionally informed interpreter of these patterns can glean superb location insight from these detailed patterns. Noteworthy are the coastal-town corridors along the West Coast (peaking at Langebaan) and Southern Cape (with peaks around notable resort towns from Hermanus in the west through Cape Agulhas and Stilbaai to Mossel Bay and farther east to Knysna); the rural valleys of Warm and Koue Bokkeveld, Slanghoek, Nuy, Villiersdorp, Grabouw, Baardskeerdersbos, McGregor, Buffeljags, Suurbraak, Koo, Op-de-Tradouw, Ladismith, Schoemanshoek and Klaarstroom; the wilderness mountain-and-valley maze of the Cederberg and the Nuweveld escarpment in the Beaufort West region. Overall, it is notable that the procedure gives significant potential spatial allocations to the low-density, less-developed rural *platteland* and Karoo regions.

A comparison of these patterns of high-potential allocation with the 11 coarsely and intuitively identified and demarcated areas prioritised as tourism development zones by SAT (2007a) for the ITDF, namely: Cape Town Foreshore; Cape Flats; Stellenbosch-Paarl-Franschhoek; Langebaan-Velddrif; Overstrand; L'Agulhas; George-Mossel Bay-Oudtshoorn; Eastern gateway (Plettenberg Bay-Knysna-Wilderness); Beaufort West; Cederberg gateway; and Route 62. These demonstrate the difference between the approaches. The coarser marketing-focussed approach allows for signal spatial indicators characterised by evocative names (like Route 62), known regions (Cederberg), administrative regionalisations (Overstrand), or town-specific notation (Beaufort West). Conversely, the fine-scale spatial directive and meaning of the more objective MCE approach analyses space more surgically to isolate development potential and opportunity. The ITDF was conceived to guide tourism development until 2012. It has given guidance to aligned spatial development programmes like provincial transport plans, provincial environmental and integrated development plans (IDPs), but the fine-scale indications of this research can guide more accurate entrepreneurial planning.

CONCLUSION AND RECOMMENDATIONS

This research gives strategic direction to developers and marketers of OAART in the Western Cape. The deliverable is an indicator of potential spatial recreationist product opportunities, spatially represented in map format at a resolution of $1km^2$ and offered as a valuable planning and development tool and aid. It identifies, exposes and explains key elements of the natural, cultural, social and policy environments in which OAART operations and endeavours exist in the Western Cape. Through this 'statistical picturing' (Olson, 2010), a resource-governance model is created that can assist private development of recreational resources. By offering information that describes fundamental aspects of the sector, and by supplying insights and recommendations for future initiatives, this research affords primary stakeholders and planning proponents' options to make informed decisions and to take knowledgeable action regarding the location of targeted development in space as demonstrated here for the Western Cape.

A focus on quality (responsible) tourism and recreation development and selective marketing to enhance experience and improve learning (Tangeland, 2011) is advocated as prerequisite for building and maintaining sustainable action and adventure product destinations in the Western Cape. The rural, eco-and OAART products must be given distinctive, innovative and spatially focussed product packaging, marketing and promotion. Growth in the Western Cape's OAART industry must not merely be about plant expansion, but rather about sustained investment behind clear choices how to differentiate the region into important target markets for the development of destinations (SAT, 2007a; Ecker *et al*., 2010). South Africa is still mainly perceived as an adventure-filled wildlife destination with striking natural beauty. Our cultural assets are largely unclear in the consumer's mind and undifferentiated from the rest of the continent (SAT, 2007a). The recreation industry needs to redefine, upgrade and freshen products and services to deliver on the promises offered by marketing messages. The outcomes of this research can play a significant role in planning efforts to fill some of the product and service gaps. It contributes to the larger picture of OAART resource potential in the province and can serve as a keystone of destination planning and reviewing the ITDF of the Western Cape province.

As in the USA (Das & Rainey, 2010), the paucity of relevant data relating to local recreation and tourism development hampers proper planning, including its location aspects. The constantly improving quality, level of detail and richness of spatial data afforded by the Spatial Data Infrastructure Act (Nr 54 of 2003) puts the possibilities for increased accuracy in informed decision support through spatial modelling of economic-sector development on a steep upward trajectory.

Acknowledgement

The author acknowledges Prof. S.L.A. Ferreira for her insights into the tourism model, Dr A. van Niekerk for GIS execution, the expert participants for their contributions during the tourism workshop, and Cape Town Routes Unlimited for permission to publish the research findings.

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(Subject Editor: Prof. Melville Saayman)