

Transboundary conservation initiatives and opportunities in the Arabian Peninsula

Michael H. Knight, Philip J. Seddon, Abdulaziz Al Midfa

Abstract. This paper summarizes the status of and opportunities for transboundary conservation areas (TBCAs) in the Arabian Peninsula. Although there has been limited development of TBCAs in the Peninsula, the concept is seen regionally as valuable to: encourage collaboration and cooperation between conservation partners; provide a shared vision; enable joint and effective ecosystem management in a larger system; encourage social, economic and ecological partnerships; facilitate the development of a sustainable sub-regional economic base; and increase international cooperation at multiple inter-government levels. Three potential sites have been identified, each focused around a charismatic species for the region: The conservation of dugongs in the marine environment from the Gulf of Bahrain to the United Arab Emirates (UAE); the conservation of Endangered Arabian Oryx *Oryx leucoryx* in the UAE-Saudi Arabia-Oman border area; and the conservation of Critically Endangered Arabian Leopard *Panthera pardus nimr* in the Yemen-Oman terrestrial borders. There has been a call for a champion, such as the Sharjah government, to drive the process at the inter-government level, with representatives of relevant conservation authorities facilitating activities at the local level.

Key words. Transboundary conservation areas, TBCA, Arabian Peninsula, Arabian Oryx, Arabian Tahr, Arabian Leopard, Dugong, conservation.

Introduction

The Arabian Peninsula, inclusive of the countries of Jordan, Saudi Arabia, United Arab Emirates (UAE), Bahrain, Qatar, Oman, Kuwait and Yemen, has a long history of traditional community-based resource conservation, applying the stewardship and conservation principles enshrined in Islamic (Shariah) law (BAGADER et al. 1991) to regulate tribal use of renewable resources such as firewood and wildlife harvests (LEWELLYN 1998). The institution of *hima* (with its specified use-areas) are some of the world's oldest and best developed traditions of resource management. These principles guided the equitable and efficient use and sharing of resources balanced with some strict elements of protection, and stimulated the development of sophisticated methods of terracing, rainwater harvesting, and irrigation, all aimed at better resource use and protection (DRAZ 1969, LEWELLYN 1998).

Formal western-styled conservation started relatively recently in the peninsula in the Hashemite Kingdom of Jordan with a royal declaration in 1965 paving the way for the establishment in 1968 of the Arabian Peninsula's first national park – Petra National Park (<http://www.rscn.org.jo>). Since then the number and diversity of protected areas on the Arabian Peninsula has increased considerably with the vast majority of protected areas established since the late 1980s and 1990s (CHILD & GRAINGER 1990, SEDDON 2000). In all these cases they were nationally focused initiatives, aimed at protecting specific unique

habitats/landscapes, charismatic, endangered or economically important species. Regional or transboundary conservation thinking was not an important focus of these protected areas when declared, even when situated adjacent international borders.

The concept of cooperative conservation over international borders appears to have started as early as 1925 with the signing of the Krakow Protocol by Poland and Czechoslovakia that saw the creation of three joint parks spanning their international borders (THORSELL & HARRISON 1990). This initiative had a landscape-scale conservation/preservation intent. The idea of using trans boundary conservation as a means of fostering regional peace came later to the fore in 1932 with the establishment of the Glacier – Waterton International Peace Park between the United States of America and Canada (SANDWICH et al. 2001), from which has emerged the popular ‘Parks for Peace’ or ‘Peace Parks’ concept. With support from institutions such as the World Bank, IUCN, and well-resourced non government organizations, transboundary conservation arrangements have increased in number and diversity from about 59 in 1988 to an estimated 227 in 2007 (WESTING 1993, ZBIEZ 2001, UNEP-WCMC 2007).

In reality, these conservation arrangements across international borders are not restricted to adjacent protected areas but could involve multiple combinations of land use, ownership (state, communal, private to name some) and often with different management objectives. This in turn has resulted in a plethora of loose terminology describing such international conservation measures. For example, transboundary natural resource management areas (TBNRMA) (GRIFFIN et al. 1999) refers to a more holistic use of natural resources across international boundaries, and does not necessarily restrict itself to protected areas. In many ways it is based upon informal community-based natural resource management (CBNRM) principles spanning international borders that could range from collaborative management of wildlife to some relaxation in geopolitical boundary restrictions. Transboundary protected areas (TBPA) (SANDWICH et al. 2001) (inclusive of transfrontier parks (TFP) or Peace Parks) refer to more formal management arrangements between proclaimed protected areas straddling international borders. The Kgalagadi Transfrontier Park, including the South African Kalahari Gemsbok National Park and the Botswanan Gemsbok National Park, is a good example of such an arrangement, which has in effect been operating as a *de facto* TFP since their proclamation in the 1930s (DE VILLIERS 1998). By contract a trans-frontier/boundary conservation areas (TFCA or TBCA) (THORSELL 1990), can incorporate multiple use zones on a combination of state, communal and/or private owned land as well as strictly protected areas. They have been primarily focused on enhancing conservation across international borders.

In this paper we have preferred to use the term ‘transboundary conservation area’ (TBCA) in reference to any form of cross-border conservation arrangement, irrespective of ownership and declaration. The use of the word ‘boundary’ appears more acceptable a description of an international border, as opposed to the use of ‘frontier’ which is more extensively referred in the southern African context (WHANDE & SUICH 2009). ‘Conservation areas’ will be used as the relationships are not restricted to adjacent protected areas but could involve a potentially diverse assortment of protected/nature areas, land uses, and ownership.

This paper will attempt to summarise the status of transboundary conservation initiatives and opportunities in the Arabian Peninsula, as well as chart the way forward in establishing future TBCAs in the peninsula. Most of the information was gleaned from a series of workshops held as part of the annual Conservation Workshops for the Fauna of Arabia held under the auspices of the Breeding Centre for Endangered Arabian Wildlife, Sharjah (HALL-MARTIN 2008, KNIGHT 2008, SEDDON & KNIGHT 2009).

Objectives of transboundary conservation initiatives

Although transboundary conservation areas are generally taken to refer to relatively large areas that straddle international boundaries and involve large scaled natural/ecological systems (BOOTH 1992), they can also involve relationships at very much smaller scales. Increased interest in TBCA type arrangements arose when it was realized that their potential benefits extended beyond the traditional biodiversity conservation and ecosystem services paradigm they have largely centered around (STERN et al. 2003). They were also seen as being important in promoting local and regional economic development (SPENCELEY 2006) as has been the focus in some of the southern African TBCA initiatives such as the Great Limpopo Transfrontier Park (GLTP) that includes the South African Kruger National Park, Zimbabwe's Gonarezhou National Park and Mozambique's adjacent Coutada 16 hunting reserve. Ecotourism (or nature-based tourism) was seen as the principle vehicle for promoting regional development in the GLTP region. Furthermore, the GLTP (as well as some other TBCAs) has been incorporated in a regional spatial development initiatives (SDI) designed specifically to promote industrial and infrastructural development in corridors in traditionally under-served areas (WHANDE & SUICH 2009).

In addition, TBCAs can facilitate international goodwill and even peace in some cases (THORSELL 1990). The establishment of a 2.42 million hectare TBCA in the Cordillera del Condor (Condor Mountain Range) region between Peru and Ecuador saw an end to regional conflict between these two countries (PONCE & ALCALDE 2003 in BRAACK et al. 2006). Furthermore, the prospects of establishing a peace park in the demilitarized zone between North and South Korea to promote regional peace has also been mooted (W. VAN RIET, former Chief Executive of Peace Parks Foundation, pers. comm.). The extended functionality of TBCAs arises primarily from the fact that conservation is largely perceived as a non-threatening or a neutral form of land use that recognises the importance of anthropogenic landscapes (MULDER & COPPOLILLO 2005). Furthermore, TBCA initiatives have also been used as a means of increasing bureaucratic power and influence for conservation bodies (inclusive of manpower and budgets) on the one side and greater cross-border control by other state institutions such as immigration and customs control on the other (WOLMER 2003). In some cases the government institutions saw this as a means of potentially addressing illegal immigration and trafficking of stolen goods or illegal substances across international borders.

With many communities separated by arbitrarily placed international borders, TBCAs have been used as a means of unifying cultural and social functions across regions, in turn reducing social pressure and threats on the conservation area (ODEGAARD 1990). This may be a point in case with the Shangaan communities divided by the South African, Mozambique and Zimbabwe borders of the GLTP (SCHOON 2008).

Thus, TBCAs can serve to:

- encourage collaboration and co-operation between conservation partners in numerous fields such as scientific, technical and managerial aspects;
- provide a shared vision for a greater area;
- open up the possibility for joint and effective ecosystem management in a larger system with better overall conservation outcomes than the individual areas alone;
- encourage social, economic and ecological partnerships where each partner can benefit and learn from these linkages;

Tab. 1. Identified potential transboundary conservation areas (TBCAs) in the Arabian Peninsula. PA = Protected Area.

Country / countries	Reserve / Park / areas	Biological/ ecological focus	Identified constraints	Progress & way forward
Sultanate of Oman- Yemen	Hawf (Yemen) Communal land (Sultanate of Oman)	Critically Endangered Arabian Leopard	Communities in place. No PA on Oman side. Stock farming conflict. Law enforcement an issue in & around Hawf Reserve. Hunting of ibex on Yemen side Overgrazing by stock and habitat degradation threatening natural habitat and prey base. Short border fence could contain some movement of ibex and leopards. Timber cutting & uncontrolled land use a threat. Informal support at Yemeni ministerial level. Fear of loss of jurisdictional control.	Realisation of need for TBCA discussions. Contact on an individual basis. Recently signed MoU after preliminary discussions with Oman, with some joint surveys undertaken. Need to maintain higher political support in both governments.
Saudi Arabia - UAE- Oman	Oryx Reserve (UAE), Rub al Khali management area (Saudi Arabia), communal land (Sultanate of Oman)	Endangered Arabian Oryx and/or Rub al Khali (Empty Quarter) has huge international appeal	Double security fence along UAE border. Hunting on Oman side and illegal activity in Saudi Arabia given limited law enforcement in the designated 'no hunting area'. Overgrazing by confined and uncontrolled oryx population in UAE Oryx Reserve. Rub al Khali survey suggests some areas of Saudi Arabia and Oman are not ideal for Oryx. Threat of development & mining. Unsustainable use of natural resources in area. Droughts and climate changes would impact on a contained Oryx population if restricted in this drought prone envi-	Saudi Arabia: Revised System Plan includes the potential for TBCAs. Internal discussions (NCWCD) and some unofficial middle management contact between neighbouring countries. Shortage of funds for existing protected areas Sultanate of Oman: No reserve on Oman side. Limited internal support thus far.

Country / countries	Reserve / Park / areas	Biological/ ecological focus	Identified constraints	Progress & way forward
Saudi Arabia- Bahrain- Qatar – UAE	Proposed Saudi Arabian reserve in the Gulf of Salwah, Hawar Islands in Bahrain, and unprotected islands of the Delma-Qarmayn area in UAE.	Dugong, & marine complex	<p>ronment. Variation in PA management effectiveness between national conservation agencies given resource limitations (capacity and financial). Changing traditional practices of moving from camels to sheep and goats. Disputes about the international boundary and restricted movement is a compounding issue. Difference in conservation values between areas.</p> <p>The Gulf of Bahrain has a considerably large fisheries industry. Existing and planned bridges, as well as rampant coastline development are major threats. The Gulf of Bahrain also exposed to pollution from major southward moving coastal current. Evidence that increasing salinity levels in the Gulf of Bahrain may be affecting sea grass production more than in the Qatar – UAE coastline. General industrial activities in the Qatar area poses a threat as the large proposed marine conservation areas that includes the entire Qatar coastline.</p>	Two joint programs exist with Qatar and Saudi Arabia. Basis for bilateral cooperation. Some existing regional agreements could form the basis to advance the concept of TBCAs. Eg ROPME.
UAE- Oman	Musandam (UAE) and the Hajar mountains	Arabian Tahr <i>Hemitragus jayakari</i>	Small scattered populations. Better habitat to the east in the Hajar Mountains and Jebel Qahwan area.	None thus far. May be better areas in Oman (eg Wadi As Sareen Nature Reserve) away from UAE border.

Country / countries	Reserve / Park / areas	Biological/ ecological focus	Identified constraints	Progress & way forward
Jordan - Saudi Arabia	Hisma (Saudi Arabia), Wadi Rum (Jordan)	Endangered Arabian Oryx, Nubian Ibex <i>Capra ibex nubiana</i> Idmi or Mountain Gazelle <i>Gazella gazella</i>	Inaccessibility of Tahrs to preferred habitat. Stock (goats) farming. Hunting and poaching. Disease from domestic goats. Politically sensitive border area.	No MoU or official contacts, only informal technical and mid-management discussions. Need to develop the concept as a basis to take to political leaders; explore advantages and possible approaches
Egypt - Saudi Arabia	Various reserves in the southern Gulf of Aqaba such as Ras Mohamed, Nabq.	Marine & coastal biodiversity	Disputed islands	
Saudi Arabia - Yemen	Farasan Islands Protected Area	Island-marine biodiversity	Political disputes over ownership of islands	Farasan Islands (Red Sea) between Saudi Arabia & Yemen with joint seabird / island management scope for TBCA. No progress.
	Mountains	Mist forests with important botanical diversity	Limited conservation areas in border area	

- facilitate the development of a sustainable sub-regional economic base with important benefits for local communities and ;
- increase international cooperation on multiple inter-government levels.

These broad objectives for TBCAs have largely attracted positive responses from conservationists, developers and politicians alike who see them as a means of meeting sustainable development type goals that in the past would have been difficult to achieve in stand-alone protected areas (DUFFY 2001). It is also important to stress that although many TBCAs are based upon perceived greater conservation outcomes, these remain to be scientifically proven as numerous international borders are determined by local political alignments and not ecoregions. Similarly, the economic and social cases are often not couched in reality (WHANDE & SUICH 2009). It is thus important to remain realistic and not over-promise the potential benefits of TBCAs.

Basic principles associated with transboundary conservation

Any TBCA initiative should be based upon the following basic principles of: a coherent shared vision; conservation relevance; trust; flexibility with regards to management and authority; patience; inclusiveness; and importantly, a learning and building attitude. SCHOON (2008) emphasized that the 'building' idea was central to the concept as it interlinked the social, institutional and managerial spheres. Thus in the ideal TBCA situation, these should be translated into:

- A strong conservation and socio-economic-political case for the relationship. This relationship should not be pursued just for the sake of it but where possible supported with rigorous scientific information.
- Demonstrated institutional and political support by the relevant conservation agencies and national governments.
- Support from the local communities.
- A multi-laterally developed treaty between the states in question. This could be initiated with the development of a memorandum of understanding (MoU) that sets the basic principles and objectives.
- The establishment of a high-level political coordinating committee with participation by all relevant parties, and lower level technical groups to implement components of a joint plan, assess lessons learnt, and guide the way forward. An independent coordinator team would ideally facilitate the establishment of these structures.
- The development of a unifying joint plan with actions, targets and deadlines to measure progress. As each area is unique, site-specific solutions should be determined as opposed to retrofitting models from elsewhere.
- Robust and long-enduring institutions. These need to be well managed and capacitated in order to be sustainable.

As each TBCA has its own unique qualities, they would in turn have different objectives that could result in quite diverse conservation outcomes. This may range from simple managerial or research cooperation between adjacent conservation agencies to full blown international cooperation and development actions. Given that such arrangements involve diverse stakeholders across international borders, they generally take considerable time to evolve to different levels of cooperation and engagement. It is thus important that each TBCA initia-

tive should never be forced by unrealistic deadlines that are unattuned to local community pace of acceptance.

Transboundary conservation opportunities in the Arabian Peninsula

The realization of the need for cross-border cooperation on conservation matters has emerged as an important concept worth exploring in the Arabian Peninsula (SEDDON & KNIGHT 2009). From an initial broad list of potential TBCAs within the peninsula (Table 1), three have been given priority according to their perceived conservation merits. These specific sites were investigated in more detail to ascertain their opportunities, constraints and the way forward with regard to establishing TBCAs in the peninsula (KNIGHT 2008, SEDDON et al. 2009).

The three identified areas are:

- The marine areas spanning the Gulf of Bahrain, around the Qatar coastline to the UAE for the conservation of the world's second largest Dugong *Dugong dugon* population (considered Vulnerable, see MARSH 2008).
- The terrestrial border between Oman-UAE-Saudi Arabia with its primary conservation focus on the Endangered charismatic Arabian Oryx *Oryx leucoryx* (IUCN 2008).
- The Hawf Reserve in Yemen-Oman terrestrial borders for its important free-ranging population of Critically Endangered Arabian leopard *Panthera pardus nimr* (MALLON et al. 2008).

Other potential TBCAs include:

- The Hisma-Wadi Rum areas in Saudi Arabia and Jordan, respectively. This would focus on a range of species, such as the Arabian Oryx, Nubian Ibex *Capra ibex nubiana* and Idmi or Mountain Gazelle *Gazella gazella*.
- The Musandam area of the UAE and the adjacent Hajjar Mountains area of Oman in the conservation of Endangered Arabian Tahr *Hemitragus [Arabitragus] jayakari*.
- Egyptian-Saudi marine and coastal areas.
- The Farasan Islands Protected Area of Saudi Arabia and adjacent Yemen coast as important island coastal biodiversity.
- The mist forests (generally above 3000 m asl) that occur in the Asir Mountains of south western Saudi Arabia that continue southwards into Yemen.

Although there has been relatively little actual progress in the Arabian Peninsula on developing formal TBCA agreements between neighbouring countries in recent years, there had been some positive signs in this regard (SEDDON & KNIGHT 2009). In the space of three years since the first meeting on TBCAs in 2007 (HALL-MARTIN 2008), the idea has gone from a cautious reluctance to a general enthusiastic acceptance of its role in enhancing conservation efforts in the Arabian Peninsula. This may have facilitated the recent development of a TBCA type MoU between Hawf Reserve in Yemen and the Sultanate of Oman.

It was realized that for conservation to be successful, whether it be the protection of space-hungry umbrella species such the Arabian Oryx, Leopard or Dugong, or the conservation of relatively small unique mist forests, this would best be achieved through international cooperation in specific regional areas (Table 1). There was also a growing appreciation that since the regions protected areas agencies have limited financial resources, there was a need to be strategic in selecting prospective areas based upon regional conservation priorities, some of

which may span international borders (HOLNESS et al. 2010). The importance of using a systematic bioregional approach to conservation planning was recognized as it would facilitate the identification of conservation areas with possible greater ecological resilience, in addition to providing necessary scientific justification. Moreover, there was also an understanding of the need for a strong conservation case to avoid the temptation of establishing TBCAs just where the opportunities existed. This is not necessarily to discourage any cross-border cooperation on conservation issues but rather to discourage the disproportionate allocation of resources, personnel and focus to ecologically less important areas, which could potentially damage the overall success of TBCAs in general (SCHOON 2008).

The potential marine TBCA from the Gulf of Bahrain to the UAE is a point in case as it has a relatively well developed regional conservation vision based partly upon relatively well understood and tracked environmental threats and the appreciation of the dugong conservation status and their role in the marine environment. There is also a wealth of supporting scientific literature on the dugongs and their environmental needs (such as PRICE & COLE 1992, PREEN 2004).

In the case of the two identified potential terrestrial sites there are less well developed regional conservation visions for the Arabian oryx and leopard. The former has a large supporting scientific literature base, primarily focused on site specific reintroduction and establishment of the species in the region (SPALTON 1999, SALTZ 1998), whereas the leopard has less supporting information (SPALTON et al. 2006). The ecological cases for the proposed terrestrial TBCAs need to be well defined and scientifically justified to win the imagination and support of upper management and political institutions, as well as potentially affected local small stock herders. The latter group were identified as a major constraint towards establishing such TBCAs (Table 1). The economic case for TBCAs is also relatively poorly developed in the region, given the minor emphasis placed upon the role of protected areas in the nature-based tourism industry in general (LLEWELLYN 2000). This component would need to be further developed if local communities are to gain down-stream benefits from conservation and reverse the negative sentiment felt by many local communities towards protected areas given the fact that many such areas were declared without substantial local community engagement (SEDDON 2000). The same issue applied in developing the GLTP between South Africa, Mozambique and Zimbabwe where the local inhabitants along the Limpopo River in Mozambique were opposed to the concept (WHANDE & SUICH 2009). SCHOON (2008) noted that in the case of the GLTP there had been a strong top-down approach in developing the TBCA, which had poor local support, whereas the KTP had stronger bottom-up support that had been cultivated over many years, with only upper level buy-in coming later in its development. It remains important to have acceptance from both local stakeholders and conservation staff (bottom-up), as well as upper management and political institutions (top-down) towards establishing governance models for the delivery of the best results for any TBCA.

The need to develop trust amongst conservation parties was also identified as an essential step in the TBCA process (Table 1). At the local level this seems to be the case with numerous unofficial individual contacts and projects proceeding between park/reserve officials of adjacent countries (Table 1). The annual Sharjah conservation meetings (SEDDON & EGAN 2008, SEDDON & KNIGHT 2009) may have also played a fundamental role in further cultivating this trust and sharing of knowledge at the broader Arabian Peninsula wide level (AL MIDFA et al. 2010, this volume). However, although there appeared to be a general understanding of the need for cross-border conservation programmes at the senior conservation management level, there has been little official endorsement of such plans. The marine con-

ervation efforts in the Arabian Gulf may be the exception (Table 1). It was suggested that the existence of regional programmes/agreements such as the Regional Conference of Plenipotentiaries on the Protection and Development of the Marine Environment (ROPME, www.ropme.org) may have played a fundamental role in developing a unified conservation action plan for the gulf. This general international acceptance would only arise from well motivated and coordinated conservation plans advocating the merits (and need) for cross-border conservation efforts, and should be an important focus area for any future TBCA initiative. Other initiatives such as the Abu-Dhabi Global Environmental Data Initiative (AGEDI, <http://www.wssd-and-civil-society.org>) may also provide an important international forum and conduit to start discussions around a regional conservation plan and possible TBCA discussions at the inter-government level. These would provide the top-down component, with the local development of plans (inclusive of communities) and cross-border relations the bottom-up part. Links to such international agreements would facilitate gaining national political support.

Several conservation authorities expressed concern that any TBCA initiative with joint management responsibilities would lead to a perceived relinquishing of national jurisdiction and control over their respective protected areas (Table 1). It is worth emphasizing that this in fact would not be the case. The development of well-articulated international MoUs and agreements would partially address this, as would the growth in trust and the building of a working relationship on the ground. Developing these relationships was expected to take time. Moreover, it remains important to match the level of governance to the identified problems (SCHOONS 2008). For small, local problems (such as small carnivores and the Arabian leopard in particular) the best solution is to develop local plans, while for broader, more regional problems (such as land tenure, security and immigration control) there would be a need for higher government involvement. This requires an adaptive and learning attitude towards governance as no management panacea approach exists. It is also important to realize that failure in certain components is inevitable and that it should be used as part of the positive learning activity towards robust institutions and relationships. The challenge is to balance the learning from experience, with avoidance of the blind application of blue print solutions from elsewhere.

Proposed way forward

Although there have been some low key engagements on conservation issues across international borders, it was felt that there was a need to increase discussion, planning and implementation of the TBCA initiatives in the Arabian Peninsula. It was also recognized that a regional champion working in conjunction with local representatives was required to drive the process at the two levels, namely the local identified sites and the inter-government agencies. The Sharjah government has been suggested as a possible candidate to drive the regional role, given their small, unthreatening political role in the region. Moreover, their leadership in convening the Sharjah conservation workshops over the last decade bears witness to their foresight in promoting regional conservation efforts and information sharing. The champion's prime function would be to gain the national political support and develop the required agreements between nations. It was suggested that the use of existing overarching current international agreements such as ROPME and AGEDI could facilitate this process. The national representatives would focus more on the lower level case specific sites within the conservation organizations.

As a precursor to this is the need for a systematic conservation plan for the region based upon updated habitat information, species distribution data, and landscape transformation data. This conservation plan with specific prioritized regional conservation areas would be a first step in identifying, potential TBCAs. This would provide further scientific support in addition to existing information for charismatic Arabian fauna such as the Arabian Oryx, Arabian Leopard, Dugong and Arabian Tahr. In addition, international cooperation between conservation bodies to address both local and regional conservation issues should proceed as a matter of priority given the realization that conservation recognizes no boundaries. These engagements should also broaden the consultative net to include important stakeholders from local communities, government departments, and private enterprise to address social and financial sustainability issues for conservation initiatives. Drawing upon insights from other international TBCA initiatives would be an essential part of the learning process. When addressing potential TBCAs it is necessary always to ask whether the net benefits of any collaboration out-weigh the costs (SCHOON 2008). This would hopefully focus attention on the on the most fruitful TBCA possibilities, thus not diluting already limited funds and capacity. The key steps to any TCBA's success are: start; engage; learn; and adapt.

References

- AL MIDFA, A., D. MALLON & K. BUDD (2010): Ten years of conservation workshops for the fauna of Arabia 2000-2009. – *Zoology in the Middle East, Supplementum 3* (Biodiversity Conservation in the Arabian Peninsula): 7-12.
- BAGADER, A.A., EL-SABBAGH, A., AL-GLAYAND, M., SAMARRAI, M. AND LLEWELLYN, O. (1991): Islamic principles for the conservation of the natural environment. – IUCN Environmental Policy and Law Paper No. 20: 1-134.
- BOOTH, V. (1992): Pre-feasibility study for the Limpopo National Park and Great Limpopo Transfrontier Park. – Maputo, Mozambique: World Bank-Global Environment Facility (GEF).
- BRAACK, L., T. SANDWITH, D. PEDDLE & T. PETERMANN (2006): Security considerations in the planning and management of transboundary conservation areas.– IUCN, Gland (Switzerland) & Cambridge (U.K.).
- CHILD, G. & J. GRAINGER (1990): A system plan for protected areas for wildlife conservation and sustainable rural development in Saudi Arabia. – IUCN, Gland (Switzerland) and NCWCD, Riyadh (Saudi Arabia), 335 pp.
- DE VILLIERS, B. (1998): Peace Parks – the way ahead: International experience and indicators for Southern Africa. – HSRC Publishers, Pretoria, South Africa.
- DRAZ, O. (1969): The Hima system of range reserves in the Arabian Peninsula: its possibilities in range improvement and conservation projects in the Middle East. – Food and Agriculture Organisation (FAO), Rome.
- DUFFY, R. (2001): Peace Parks: The Paradox of Globalisation. – *Geopolitics* 6(2): 1-26.
- GRIFFIN, J.D., D. CUMMING, SIMON METCALFE, M. T'SAS-ROLFES, AND J. SINGH (1999): Transboundary Natural Resource Management in Southern Africa: Main Report. Washington, DC: – Biodiversity Support Program, c/o World Wildlife Fund.
- HALL-MARTIN, A. (2008): The role of the Peace Parks Foundation in facilitating transfrontier conservation in Southern Africa. In: P. SEDDON & J. A. EDMONDS (Eds), *Proceedings of the 8th Annual Conservation Workshop for the Fauna of Arabia: Protected Areas*. – Environment and Protected Areas Authority, Sharjah, United Arab Emirates.
- HOLNESS, S., M. SORENSEN, M. KNIGHT & Y.R.A. OTHMAN (2010): GIS & Systematic Conservation Planning Workshop. In: P. SEDDON & K. BUDD (Eds), *Proceedings of 11th Conservation*

- Workshop for the Fauna of Arabia and First Conference on Biodiversity Conservation in the Arabian Peninsula. – Environment and Protected Areas Authority, Sharjah, United Arab Emirates, 79 pp.
- IUCN SSC ANTELOPE SPECIALIST GROUP (2008): *Oryx leucoryx*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.1. <www.iucnredlist.org>.
- KNIGHT, M. H. (2008): Prioritization of Transfrontier Conservation Areas. In: Proceedings of the 9th Annual Conservation Workshop for the Fauna of Arabia: Protected Areas. Environment and Protected Areas Authority, Sharjah, United Arab Emirates.
- LLEWELLYN, O. A. (1998): The basis for a discipline of Islamic Environmental Law. – Unpublished draft manuscript. NCWCD, Riyadh, 29 pp.
- LLEWELLYN, O. A. (2000). The WCPA regional action plan and project proposal for North Africa and the Middle East. – Parks 2: 2-10.
- MALLON, D. P., U. BREITENMOSER, & J. AHMAD KHAN (2008): *Panthera pardus* ssp. *nimr*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.1. – www.iucnredlist.org.
- MARSH, H. (2008): *Dugong dugon*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.1. – www.iucnredlist.org.
- MULDER, M. B. & P. COPPOLILLO (2005): Conservation: Linking Ecology, Economics and Culture. – Princeton University Press, New Jersey.
- ODEGAARD, C. (1990): Parks for Peace. In: J. THORSELL (Ed.), Parks on the borderline: Experience in Transfrontier Conservation. – Cambridge (UK), p. 89-94.
- PONCE, C. & M. ALCALDE (2003): The Condor Corridor. –Tropical Forest Update 13: 13-14.
- PREEN, A. (2004): Distribution, abundance and conservation status of dugongs and dolphins in the southern and western Arabian Gulf. – Biological Conservation 118: 205-218.
- PRICE, A. R. G. & S. L. COLES (1992): Aspects of seagrass ecology along the western Arabian Gulf coast. – Hydrobiologia 234: 129-141.
- SALTZ, D. (1998): A long-term systematic approach to planning reintroductions: the Persian fallow deer and the Arabian oryx in Israel. – Animal Conservation 1: 245-252.
- SANDWITH, T., C. SHINE, L. HAMILTON & D. SHEPPERD (2001): Transboundary Protected Areas for Peace and Co-operation. – IUCN: Glanmd (Switzerland) & Cambridge (UK). 111 pp.
- SCHOON, M. (2008): Building robustness to disturbance: Governance in Southern African Peace Parks. – Unpublished Ph.D., Indiana University, USA.
- SEDDON, P. (2000): Trends in Saudi Arabia: Increasing community involvement and a potential role for eco-tourism. – Parks 10 (1): 11-24.
- SEDDON, P. J. & D. EGAN (2008): 9th Conservation Workshop for the Fauna of Arabia. – Oryx 42: 172-173.
- SEDDON, P. & M. H. KNIGHT (2009): 10th Conservation Workshop for the Fauna of Arabia: Protected Area Systems in the Arabian Peninsula. – Wildlife Middle East 4 (1): 8.
- SPALTON, J. A. (1999): The food supply of Arabian oryx (*Oryx leucoryx*) in the desert of Oman. – Journal of Zoology 248 (248): 433-441.
- SPALTON, J. A., H. M. HIKMANI, D. WILLIS, & A. S. BAIT SAID (2006): Endangered Arabian leopards *Panthera pardus nimr* persist in the Jabal Samhan Nature Reserve, Sultanate of Oman. – Oryx 40(3): 1-10.
- SPENCELEY, A. (2006): Tourism in the Great Limpopo Transfrontier Park. – Development Southern Africa 23 (5): 649-67.
- STERN, M. J., C. MARGOLUIS, A.G. LANFER, & U. M.GOODALE (2003). Transboundary Protected Areas: The Viability of Regional Conservation Strategies. - Journal of Sustainable Forestry 17 (1/2): 1-6.
- THORSELL, J. (1990): Parks on the Borderline: Experience in Transfrontier Conservation. – IUCN Publication Services, Cambridge (UK).
- THORSELL, J. & J. HARRISON (1990): Parks that promote peace: A global inventory of Transfrontier Nature Reserves. In: J. THORSELL (Ed.), Parks on the Borderline: Experience in Transfrontier Conservation. – Piggott Printers, Cambridge (UK), p. 3-22.
- UNEP-WCMC (2007): UNEP-WCMC List of Transboundary Protected Areas, 2007 [cited December 18 2007]. Available from www.tbpa.net/tpa_inventory.html.

- WESTING, A. H. (1993): Transfrontier Reserves for Peace and Nature: A Contribution to Human Security. – United Nations Environment Programme, Nairobi.
- WHANDE, W. & H. SUICH (2009): Transfrontier Conservation Initiatives in Southern Africa: Observations from the Great Limpopo Transfrontier Conservation Area. In: H. SUICH, B. CHILD & A. SPENCELEY (Eds), *Evolution & Innovation in Wildlife Conservation: Parks and Game Ranches to Transfrontier Conservation Areas*. – Earthscan, London, p. 373-391.
- WOLMER, W. (2003): Transboundary Conservation: The Politics of Ecological Integrity in the Great Limpopo Transfrontier Park. – *Journal of Southern African Studies* 29(1): 261-278.
- ZBIEZ, D. (2001): Global List of Complexes of Internationally Adjoining Protected Areas. In: T. SANDWICH, C. SHINE, L. HAMILTON & D. SHEPPARD (Eds), *Transboundary Protected Areas for Peace and Co-Operation*. – IUCN, Gland (Switzerland), p. 55-75.

Authors' addresses: M. H. Knight, Park Planning & Development, Conservation Services Division, South African National Parks, Port Elizabeth, South Africa, & Center for African Conservation Ecology, Department of Zoology, Nelson Mandela Metropolitan University, Port Elizabeth, South Africa. – P. J. Seddon, Department of Zoology, University of Otago, PO Box 56, Dunedin, New Zealand. – Abdulaziz Al Midfa, Breeding Centre for Endangered Arabian Wildlife, Environment & Protected Areas Authority, Sharjah, United Arab Emirates. – Email: mknight@nmmu.ac.za.

