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Protected Areas in Selected Arab Countries of the Levant Region (Syria, Lebanon & Jordan): An Evaluation of Management and Recommendations for Improvement

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1. Introduction

Global trends in biodiversity conservation have frequently been reported as being unsatisfactory, especially after the 2010 targets of the Convention on Biological Diversity (CBD) failed to be met (2010 Biodiversity Indicators Partnership 2010). Despite some notable conservation successes at various scales (Sodhi et al., 2011), anthropogenic impacts go largely unabated and increasingly endanger the planet's biota and life support systems (Dirzo & Raven, 2003). One of the main approaches to halting biodiversity loss has been the establishment of protected areas (PAs), an undertaking which has seen a prolific growth in recent decades in terms of both number and spatial extent (Chape et al., 2005; Coad et al., 2008a). While the number of PAs under national or international programs and legislation has been rising on a global level (Butchart et al., 2010; Coad et al., 2008b), biodiversity loss continues even within some PAs (Bonham et al., 2008; Craigie et al., 2010; Gaston et al., 2008; Hockings & Phillips, 1999; Oates, 1999). Why is this?

While the answer to this question is complex, one important factor being closely investigated is the effectiveness level of PAs management (Cantu-Salazar & Gaston, 2010; Mulongoy & Chape, 2004). It is now clear that the effectiveness of PAs in conserving biodiversity cannot be inferred simply as a result of their number and size, but also depends on their location, structure (shape, connectivity to other sites, etc.) and, of equal importance, their management (Anthony & Szabo, 2011; Rodrigues et al., 2004). Many evaluation tools have been developed for assessing and monitoring PA management effectiveness, many of which are based on the International Union for Conservation of Nature - World Commission on Protected Areas (IUCN-WCPA) Framework and are now commonly used worldwide (Ervin, 2003; Leverington et al., 2008; WWF, 2007).

Three Arab countries of the Levant region: Syrian Arab Republic (Syria), Hashemite Kingdom of Jordan (Jordan), and Lebanese Republic (Lebanon), are part of the Mediterranean Basin hotspot area for conservation (Mittermeier et al., 2004; Myers et al.,

2000). Given the high global conservation value of their fauna and flora, and their complex socio-political and economic contexts, these countries offer an excellent opportunity for biodiversity research. The rich historical background and turbulent political situation of the area has sometimes negatively influenced the degree of national or international attention given to nature protection. However, in recent decades, more sustained efforts have been made to create well-defined, legally recognized PAs in the region. While the three countries are geographically related, they present many differences in their ecosystems, national governance, and PAs establishment and management systems.

The call by Hockings et al. (2006: viii) to "look for common threads... to find trends, themes and lessons across regions" is particularly relevant in our study, as there is a paucity of documented data on PA management effectiveness evaluation in this region. Our research provides a valuable 'snapshot' evaluation of the current status of management of established PAs and UNESCO Biosphere Reserves in Lebanon, Jordan and Syria based on data collected in September 2011, during the 'Arab Spring' period, with Syria being most seriously impacted at this time. Our evaluation method is based on the thirty-three indicators developed by Leverington et al. (2010) that provide a practical and comprehensive approach for a quick evaluation of PA management effectiveness. This chapter provides a critical review of the current situation in the Levant region and compares it with the global results reported by Leverington et al. (2010). Here, we address three pertinent questions:

1. How effective is protected area management?
2. Which aspects of management are most effective?
3. Which factors are most related to (a) overall effectiveness, and (b) successful outcomes?

The results of this comparison are then used to devise recommendations for improving the management of PAs in the Levant region, which we hope will contribute to improving the conservation of its unique biodiversity.

2. Management effectiveness of protected areas in global agendas

Management effectiveness evaluation (MEE) is defined by Hockings et al. (2006: xiii) as "the assessment of how well the PA is being managed – primarily the extent to which it is protecting values and achieving goals and objectives. The term management effectiveness reflects three main themes:

- design issues relating to both individual sites and PA systems;
- adequacy and appropriateness of management systems and processes; and
- delivery of PA objectives including conservation of values."

The absence of a coherent, unified set of indicators to measure PA effectiveness in reaching conservation goals, combined with the significant rise in global impacts of human activities on PA conservation capacity, created an 'urgent' need to improve PA management effectiveness within the short (2010) deadline of the CBD agenda (Chape et al., 2005). As reported by IUCN, "Many protected areas around the world are not effectively managed. In response, management effectiveness will continue as a priority with a focus on improving on and learning from past approaches" (IUCN-WCPA, 2009: 1).

Many initiatives were undertaken towards this aim, for example, as part of the CBD's 7th Conference of Parties (COP-7) Programme of Work on Protected Areas (PoWPA) in 2004, nations committed to develop assessment systems to report on PA effectiveness for 30% of their PAs by 2010 (WWF, 2007), a commitment that was subsequently increased to 60% by 2015 (CBD 2010). A second initiative was adopted at the CBD/COP-8 meeting in 2006, where delegates reviewing the first PoWPA implementation phase highlighted the need to improve PA management effectiveness by tackling the following underlying issues: (i) lack of financial resources; (ii) lack of technical assistance and capacity-building for PA management staff; (iii) poor governance; and (iv) political, legislative and institutional barriers (SCBD, 2009; UNEP, 2006). In response, the purposes underlying the development of management effectiveness evaluation were that it should lead to improved management in changing environments, more effectively allocate resources, enhance transparency and accountability, and build constituency by involving the community and promoting PA values (Hockings et al., 2006).

Further, as part of technical assistance and capacity building, one solution highlighted by international experts was to create cost-effective evaluation tools for monitoring progress towards management targets. As underscored in the Durban Congress recommendations: "New methodologies to assess management effectiveness should be developed to address the specific gaps identified […] including rapid, site level assessments of both management effectiveness and threats" (IUCN, 2005: 92). Actions taken in this perspective include the development by the IUCN-WCPA of a 'Protected Areas Programme' which partially aimed at providing capacity-building for increasing management effectiveness of PAs through the provision of guidance, tools and other information, and a vehicle for networking (IUCN-WCPA, 2009).

3. Monitoring tools

Monitoring has been best described as the collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective (Elzinga et al., 2001; Tucker, 2005). As one essential component of adaptive management (Holling, 1978; Salafsky et al., 2001; Tucker, 2005), monitoring involves a continuous evaluation of progress towards project goals including the preservation of species from internal or external threats (Margules & Pressey, 2000). Monitoring is also an essential part of systematic conservation planning as it constitutes the last of six stages as defined by Margules & Pressey (2000).

Several tools and indicators have been developed by international organizations and experts to evaluate PA management effectiveness (Leverington et al., 2008). Some of the most widely used include the Management Effectiveness Tracking Tool (METT) (WWF, 2007), Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) (Ervin, 2003), and Threat Reduction Assessment (TRA) (Salafsky & Margoluis, 1999; Anthony, 2008). However, as different PA sites and networks have diverse characteristics (e.g. management structure, geographical coverage and variation) and are embedded within various cultural, political and socio-economic contexts, there is no one standard tool that is globally accepted so far (Chape et al., 2005). Consequently, the tool chosen for monitoring management effectiveness should be adapted to the specific settings, capacities, needs and objectives of the PA or PA network in which it will be applied.

3.1 World Commission on Protected Areas (WCPA) framework

The IUCN-WCPA task force responded to the need for management effectiveness tracking tools by developing a framework in 1997 that aims at providing overall guidance in the development of more adapted assessment systems and to encourage the presence of standards for assessment and reporting (Hockings et al., 2000; WWF & WB, 2003). The WCPA Framework was developed on the concept that good PA management is based on six elements: context, planning, inputs, processes, outputs, and outcomes (see Table 1).

Element of Evaluation	Explanation	Criteria assessed	Focus
Context	*Where are we now?* Evaluation of importance, threats & policy environment	Significance Threats Vulnerability National context Partners	Status
Planning	*Where do we want to be?* Evaluation of PA design & planning	PA legislation & policy PA system design Management planning	Appropriateness
Inputs	*What do we need?* Evaluation of resources needed to carry out management	Resourcing of agency Resourcing of site	Resources
Processes	*How do we go about it?* Evaluation of way in which management is conducted	Suitability of management actions	Efficiency & appropriateness
Outputs	*What were the results?* Evaluation of implementation of management programs & actions Delivery of products & services	Results of management actions Services & products	Effectiveness
Outcomes	*What did we achieve?* Evaluation of outcomes & the extent to which they achieved objectives	Impacts/effects of management in relation to objectives	Effectiveness & appropriateness

Table 1. Summary of the IUCN-WCPA Framework (adapted from Hockings et al., 2006).

In summary, the cycle starts by an understanding of the context of values and threats present in the PA. It then progresses through planning, allocating resources and processing management actions. These result in products and services that have a final impact on management objectives (Hockings et al., 2006; WWF, 2007; WWF & WB, 2003). The WCPA Framework also stresses the importance of establishing clear, measurable, and outcome-based objectives as a basis for the whole management process and for better monitoring of results (MacKinnon et al., 1986; Tucker, 2005). The WCPA provided the first consistent scheme to monitoring PA management effectiveness, and has been used by many other experts/organizations to develop specific assessment tools (e.g. METT and RAPPAM).

Based on the plethora of scoring and monitoring methodologies, Leverington et al. (2010) compiled over 8000 assessments from more than 50 methodologies to develop a common

scale and list of 33 'headline indicators'. These indicators are categorized according to the six evaluative elements embedded within the IUCN-WCPA Framework (see Table 1), and serve as the indicators utilized in our own study.

4. Conservation values and protected areas in Syria, Lebanon, and Jordan

4.1 The Levant region

The word Levant comes from the French language meaning 'rising'. After World War I, the French Mandates of Syria and Lebanon (1920-1946) were called the Levant States but the word now mostly refers to the geographic and cultural zone of West Asia bounded by the Syrian Desert to the east, Mediterranean Sea to the west, Taurus Mountains to the north, and the Arabian Desert to the south. Nowadays, the Levant refers to most of modern Syria, Lebanon, Jordan, Palestinian Territories, Israel, and sometimes parts of Turkey and Iraq. It is a more or less heterogeneous region, divided into areas of diverse ecological and environmental character close to that of southern California (Living University, 2009; Sabatinelli, 2008).

Syria, Lebanon and Jordan are three neighboring countries of the East Mediterranean Basin, which differ in their number and extent of formal reserves and biosphere reserves (Table 2). Syria and Lebanon are bordered by the East-Mediterranean coast on their west side, while Jordan is further situated inland and separated by Israel and Palestinian lands to the Mediterranean Sea (Fig.1).

Country	Area (km²)	Population[a]	No. of PAs[b]	% coverage of PAs
Jordan	89,342	6,508,271	9[c]	1.7
Lebanon	10,451	4,143,101	13[d]	6.2
Syria	185,180	22,517,750	27[e]	1.4

[a] most recent estimate, according to www.cia.gov/library/publications/the-world-factbook/geos/
[b] for definition of PA used in our study, please see section 5.1.1.
[c] http://www.rscn.org.jo and http://www.aqabazone.com/
[d] MOE-L et al. 2011
[e] SAR et al. 2009

Table 2. Characteristics of countries included in this study.

4.2 Conservation values of the region

Syria, Lebanon and Jordan are countries with high conservation values within the Mediterranean Basin hotspot area. The Mediterranean Basin, stretching from northern Italy to Morocco, and from Portugal to Jordan, has been recognized as an international hotspot area for biodiversity (CI, 2007; Myers et al., 2000). This hotspot region hosts about 22,500 endemic vascular plant species, more than four times the total amount found in the rest of Europe (CI, 2007).

A global hotspot analysis of the 5 regions in the world with a Mediterranean climate identified 10 red alert hotspot areas in the Mediterranean Basin, one of which includes Lebanon and Syria (Medail & Quezel, 1997, 1999). This area is characterized by a high level of plant richness and endemism (Medail & Quezel, 1999; Talhouk & Abboud, 2009). The historical high level of anthropogenic threats in the Mediterranean region has been pressuring the natural diversity and threatening its persistence, making it a hotspot area

Fig. 1. Map showing Syria, Lebanon and Jordan as part of the Levant and East-Mediterranean region.

under threat (CI, 2007; Cuttelod et al., 2008). The IUCN's Redlist classifies 143 species as "Threatened" in the 3 countries in total, of which 82 are vertebrates (IUCN, 2011).

The 2009 Report of the Arab Forum on Environment and Development, covering 20 Arab countries, reported Lebanon and Syria as two of the countries with the richest biodiversity in the Arab world with recorded numbers above 3000 and 5000 (species/country) for flora and fauna, respectively (Talhouk & Abboud 2009).

Lebanon has one of the highest densities of floral diversity in the Mediterranean Basin, which is in turn considered one of the most diverse regions in the world. Lebanese biodiversity includes 4633 flora and 4486 fauna species of which many are threatened (MOE-L et al., 2009). Syria lists 3300 flora species and more than 3300 fauna species on land and in water (SAR et al., 2009). Jordan hosts more than 2500 species of flora and while the total number of fauna species is not reported, more than 75 species of mammals, 425 birds, 450 fish, and 102 reptiles and amphibians have been mentioned in the Fourth National Report to the CBD (MOE-J, 2009).

Moreover, Lebanon has a remarkably high flora species/area ratio of 0.25 species/km^2 compared with 0.022 for Jordan, and 0.017 for Syria (MOE-L et al., 2009). The faunal diversity of Lebanon is also relatively higher than Syria and Jordan with a ratio of 0.028 species/ km^2

compared with 0.019 and 0.015 for Syria and Jordan, respectively (MOE-J, 2009; MOE-L et al., 2009). Despite their international conservation value, Syria, Lebanon and Jordan have only relatively recently focused their efforts on improving biodiversity conservation through the creation of PAs. These neighboring countries present many differences in their PAs management and monitoring systems as they are at different stages of PA evolution. Given the economic and political context of these countries and the lack of research on PAs, they represent interesting case-studies in the Arab and international arena. From a national and political perspective, they share a regional atmosphere of political instability, and a common lack of national prioritization for biodiversity conservation.

4.3 Protected areas

4.3.1 Jordan

Jordan currently includes nine formally recognized reserves (Table 3), with two designated as Biosphere Reserves (Dana, Al-Mujib) (UNESCO, 2011). The management of these sites has developed under several conservation projects; however the Fourth National Report to the CBD in Jordan still reports many obstacles to effective conservation encompassing PAs, including 'Incomplete national guidelines and management plans for conservation sites', and the 'lack of a national knowledge management and data processing system for monitoring and reporting on biodiversity' (MOE-J, 2009: 15). Seven PAs in Jordan are managed by the Royal Society for the Conservation of Nature (RSCN) in agreement with the Ministry of Environment (MOE). The other two PAs (Aqaba Marine Park, and Wadi Rum Protected Area) fall under the direct management of Aqaba Special Economic Zone (ASEZA) (RSCN, 2008).

A report by RSCN (2008) presents the results of an evaluation carried out on all 8 PAs in Jordan (at that time) to assess their management effectiveness for the first time since their establishment. The evaluation was done through a joint effort between the managing staff of the reserves, RSCN, ASEZA and IUCN local office experts, using the METT tool. Results reflected an "acceptable level of management effectiveness for all sites" (RSCN, 2008: 4) however, in some cases, there was a clear difference in the management effectiveness scores between sites. All six elements of the METT tool: context, planning, inputs, process, outputs and outcomes, were analyzed relatively to the overall score, consistently showing positive influence on the final score (RSCN, 2008).

Recommendations for improvement were consistent with the Fourth National Report to the CBD, demanding greater official recognition and integration of the PA network and related resource management policies into national strategies and action plans (MOE-J, 2009). Moreover, more effective national bylaw drafting and finalization was requested for issues relating to PA threats such as hunting. The strengthening and systemization of management plans' monitoring and evaluation was also recommended in order to provide more rapid feedback to PAs management teams and to allow more effective adaptive management practices (RSCN, 2008).

4.3.2 Lebanon

The official and legal designation of PAs in Lebanon began in 1992 when the first two Nature Reserves were designated: Horsh Ehden (mixed forest), and Palm Islands (marine

reserve). The *State and Trends of the Lebanese Environment 2010* report recognizes 10 legally established Nature Reserves (marine, coastal and mountain ecosystems) under the jurisdiction of the MOE in Lebanon, which cover approx. 2.2% of the Lebanese territory (MOE-L et al., 2011). In addition, there are three internationally recognized Biosphere Reserves (Shouf, Jabal Rihane, Jabal Moussa), of which Shouf is also (partially) a Nature Reserve. The management of these PAs in Lebanon relies mainly on managing institutions' projects funds, although for Nature Reserves, funding is also allocated annually from the MOE. Despite several PAs having developed management and/or monitoring plans, the effective implementation of these plans is often hindered by the lack of technical skills and resources, or minimal follow-up by the national managing teams. Moreover, the absence of a national monitoring plan remains a major impediment for effective biodiversity conservation (Matar & Anthony, 2010).

Concerning monitoring and evaluation of conservation efforts in Nature Reserves, plans in Lebanon have been focused so far on the use of biological indicator species and Geographic Information Systems (MOE-L, 2002; MOE-L & LU 2004a, 2004b; UNDP, 1995, 2005), which has led to an improvement in reporting of species and habitats, and area coverage. However the monitoring pace has been slow and unsustainable due mostly to limited funds and project dependency (UNDP, 2005). The need to have a cost-effective tool to monitor management effectiveness was identified and was partially addressed by the MOE under the Stable Institutional Structure for Protected Areas Management (SISPAM) project which developed an adapted version of METT for Lebanese Nature Reserves management monitoring (Hagen & Gerard, 2004; MOE-L, 2005, 2006a, 2006b). Yet, political turmoil and the resultant governmental instability after the 2006 war has retarded the ratification of the decision to implement the SISPAM outcomes (including the adapted METT monitoring tool), leaving the choice and implementation of METT (or similar tools) up to individual PAs.

4.3.3 Syria

According to the latest Syrian report for the CBD, there are 27 legally established PAs in Syria covering 1.4% of the country's territories, including the Lajat Biosphere Reserve established in 2009 (SAR et al., 2009). Most PAs still lack an effective management system and a biodiversity monitoring strategy (SAR et al., 2009). Since 2004, and in the scope of a UNDP-GEF 'Biodiversity Conservation and Management Project', only three PAs have been developed: the Abou-Qubies in central-northwestern Syria, the Al Fourounloq (or Furunloq) in the northwestern coastal region of Syria and Jebel Abdul Aziz in northeastern Syria (UNDP, 2004; SAR et al., 2009). Through this project, management practices focusing on the participation of local communities were emphasized and established for the three reserves (UNDP, 2004). Further, the 2009 CBD report highlighted the imminent need for a more thorough identification of biodiversity hotspots within the Syrian borders with the aim to extend the PA system and improve coverage of important ecological sites (SAR et al., 2009). On the other hand, the absence of effective management programs and of a national monitoring strategy was highlighted as a priority for the Syrian Arab Republic's government. Management of all PAs (including the Lajat BR) in Syria remains a centralized process under the Ministry of State for Environmental Affairs (SAR et al., 2009).

5. Methods

5.1 Data collection

5.1.1 Survey and response levels

In addition to archival research, which was based on published data concerning PAs in Syria, Lebanon, and Jordan (including Fourth National Reports to CBD), we prepared and conducted an evaluation survey sent by email to identified representatives of PAs' managing institutions (direct management teams), who were judged to be the most appropriate respondents to complete the evaluation given their familiarity with the site and direct on-site management experience. Criteria for PA selection was based on the adopted definition of a PA for this study, i.e. "a formal reserve or biosphere reserve, recognized nationally and/or internationally".

Accordingly, 9 PA representatives were contacted in Lebanon, of which 8 responded (Table 3). The respondents' sample includes six Nature Reserves designated by law from the MOE, one of which is included in a Biosphere Reserve (Shouf), and two other Biosphere Reserves. In Jordan, representatives from 7 RSCN PAs responded, including two Biosphere Reserves. For Syria,

Name of Protected Area	Year of National Designation	International Designation (year)	Area (ha)
Jordan			
Ajloun Forest Reserve	1989		1200
Azraq Wetland Reserve	1978		1200
Dana Biosphere Reserve	1993	BR (1998)	29,200
Dibeen Forest Reserve	2005		850
Al-Mujib Nature Reserve	1987	BR (2011)	21,200
Shaumari Wildlife Reserve	1987		2200
Yarmouk Nature Reserve	2010		206
Lebanon			
Al Shouf Cedar Nature Reserve / Shouf Biosphere Reserve	1996	BR + IBA (2005)	16,000 (NR) 50,000 (BR)
Bentael Nature Reserve	1999	IBA	110
Horsh Ehden Nature Reserve	1992	IBA	1100
Jabal Moussa	2008	BR + IBA (2009)	6500
Jabal Rihane	2006	BR (2007)	11,300
Palm Islands Nature Reserve	1992	IBA, Ramsar site, SPA	415
Tannourine Cedar Forest Nature Reserve	1999	IBA (2006)	620
Tyre Coast Nature Reserve	1998	Ramsar site (1999)	380
Syria			
Abou-Qubies	1999		4500
Al Fourounloq	1999		5390
Jebel Abdul Aziz	1993		49,000

Note: BR=Biosphere Reserve, IBA=Important Bird Area, SPA=Specially Protected Area

Table 3. Protected areas included in the study, their year of designation, and area.

data collection was very difficult since the country was engaged in a political crisis during the time of the survey, with a major revolution against the regime; hence the response rate was very low (3 of 27 PAs).

5.1.2 Survey questionnaire

The survey questionnaire was based on the 33 indicators developed by Leverington et al. (2010) which comprehensively summarize reviewed indicators from all Protected Areas Management Effectiveness (PAME) methodologies (Table 4). The indicators are grouped into

Element	Headline Indicator
Context	Level of significance
	Extent and severity of threats
	Constraint or support by external political and civil environment
Planning	Protected area gazettal (legal establishment)
	Tenure issues
	Adequacy of protected area legislation and other legal controls
	Marking and security or fencing of park boundaries
	Appropriateness of design
	Management plan
Input	Adequacy of staff numbers
	Adequacy of current funding
	Security/reliability of funding
	Adequacy of infrastructure, equipment and facilities
	Adequacy of relevant and available information for management
Process	Effectiveness of governance and leadership
	Effectiveness of administration including financial management
	Management effectiveness evaluation undertaken
	Adequacy of building and maintenance systems
	Adequacy of staff training
	Staff/other management partners skill level
	Adequacy of human resource policies and procedures
	Adequacy of law enforcement capacity
	Involvement of communities and stakeholders
	Communication program
	Appropriate program of community benefit/assistance
	Visitor management (visitors catered for and impacts managed appropriately)
	Natural resource and cultural protection activities undertaken
	Research and monitoring of natural/cultural management
	Threat monitoring
Outputs	Achievement of set work program
	Results and outputs produced
Outcomes	Conservation of nominated values—condition
	Effect of park management on local community

Table 4. The 33 indicators used in the common PAME reporting format, according to evaluation element.

the 6 evaluation elements of the WCPA Framework, which also constitute the most effective framework for quantitative evaluations of PA management effectiveness (Hockings, 2003).

In contrast to Leverington et al.'s (2010) scoring on a scale from 0 to 1, respondents in our study were asked to allocate a score to each and all indicators on a scale from 0 to 10, where 0 represented the lowest measurement (0 = no management at all/no progress) and 10 represented the optimum situation (10 = high management standards/ideal situation achieved).

Given the subjective nature of *scoring* (in contrast to *monitoring*), scores are allocated qualitatively, are perception-based, and therefore are only estimates of progress (Cook & Hockings, 2011; Hockings, 2003). Thus, we recognize this limitation and interpret our results with caution, especially in the absence of complementary quantitative data. Nevertheless, the utility of this scoring does allow a rapid 'snapshot' self-evaluation of PA management status based on which recommendations for improvement can be derived.

5.2 Data analysis

Quantitative data were analyzed using IBM® SPSS® Statistics (ver. 19). Both univariate and bivariate descriptive statistics were used, including measures of central tendency and dispersion, and Pearson's Correlation when exploring correlations between interval level variables. When comparing means, *z*-tests were used to compare sample and population means, *t*-tests were utilized for two independent samples and ANOVA for three or more samples. If ANOVA indicated significant mean differences, Scheffe post hoc tests which are appropriate when sample sizes are unequal, were used to identify which means differed (Scheffé, 1953). Alpha level for all tests was set at 0.05. We present national data as aggregates and compare countries to one another, and also to the global results from Leverington et al. (2010), which serves as a rough benchmark for comparison.

6. Results

Overall, the management effectiveness scores across the 18 PAs in the studied region ranged from 3.58 to 9.18, with a mean score of 7.01± 1.54 (Fig. 2). This value is significantly greater (z=4.27, p<.001) than the mean of 5.30± 1.7 (adjusted based on scale difference) reported by Leverington et al. (2010), based on their global set of 3184 assessments.

From the completed questionnaires, the PA management effectiveness mean score for Jordan was 8.50± 0.72 (n=7), 6.55± 0.08 for Syria (n=3), and 5.87± 1.22 for Lebanon (n=8) (Fig. 3). Jordan's mean score is significantly greater than that of both Syria's (t=7.045, p<.001, df=6.631) and Lebanon's (t=4.981, p<.001, df=13). Moreover, only Jordan had a significantly higher mean score than the global average (z=4.98, p<.001).

When we compared the three countries according to the six evaluative elements, Jordan had significantly higher mean scores than Lebanon across all categories, except *outcomes* (see Fig. 4; Table 5). Moreover, Jordan's mean scores were significantly higher than Syria's in the *context* category. It is also noteworthy that mean scores for *output* indicators (achievement of set work program; results and outputs produced) had relatively high variability within both Jordan and Lebanon PAs.

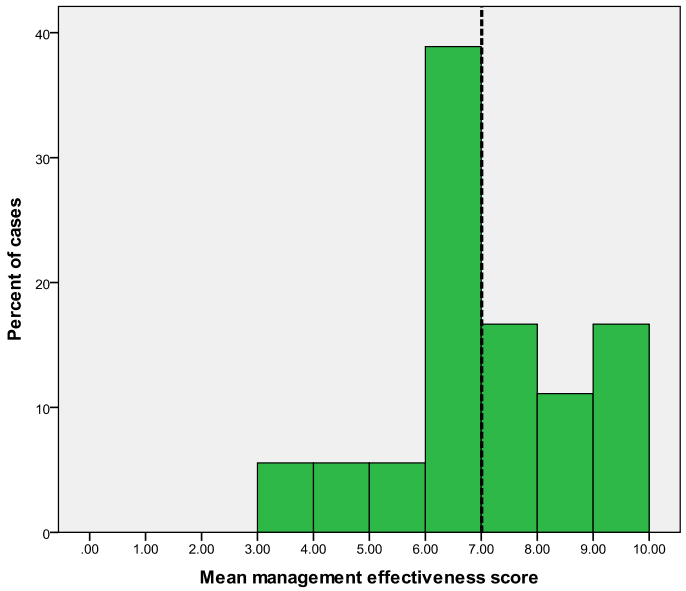

Fig. 2. Distribution of mean scores for protected area management effectiveness assessments in Jordan, Lebanon, and Syria. (Mean score across all assessments is shown as a *vertical line; N*=18).

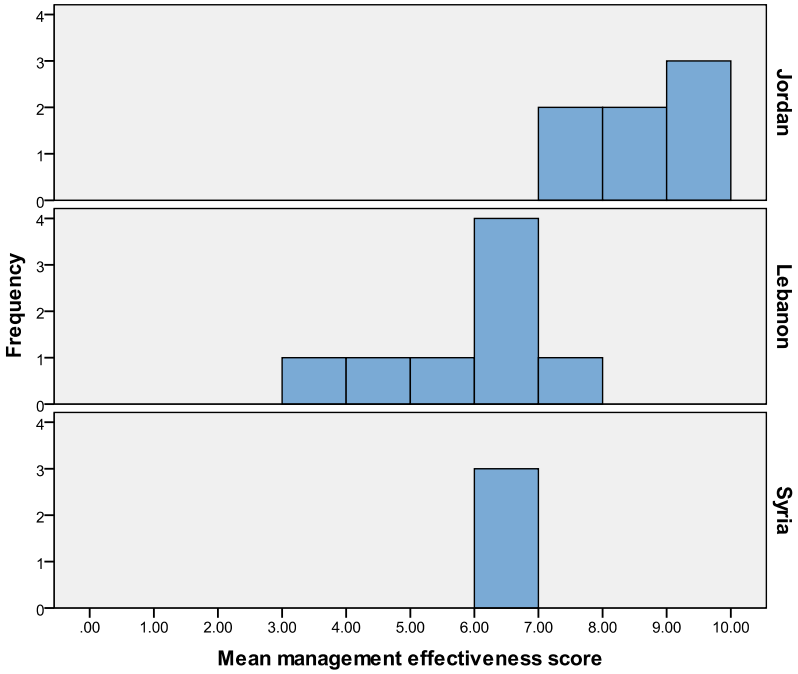

Fig. 3. Mean management effectiveness scores across the region (*N*=18).

Dependent Variable	(I) Country where PA located	(J) Country where PA located	Mean Difference (I-J)	Std. Error	Sig.
Mean score of *context* indicators	Jordan	Lebanon	1.929	.4085	.001
		Syria	2.651	.5446	.001
Mean score of *planning* indicators	Jordan	Lebanon	2.458	.5355	.001
Mean score of *input* indicators	Jordan	Lebanon	2.639	.6602	.004
Mean score of *process* indicators	Jordan	Lebanon	2.913	.6029	.001
Mean score of *outputs* indicators	Jordan	Lebanon	2.982	.9376	.021

Table 5. Multiple comparisons of mean scores of evaluative elements across the three countries. Only significant mean differences are shown, based on Scheffe post hoc tests.

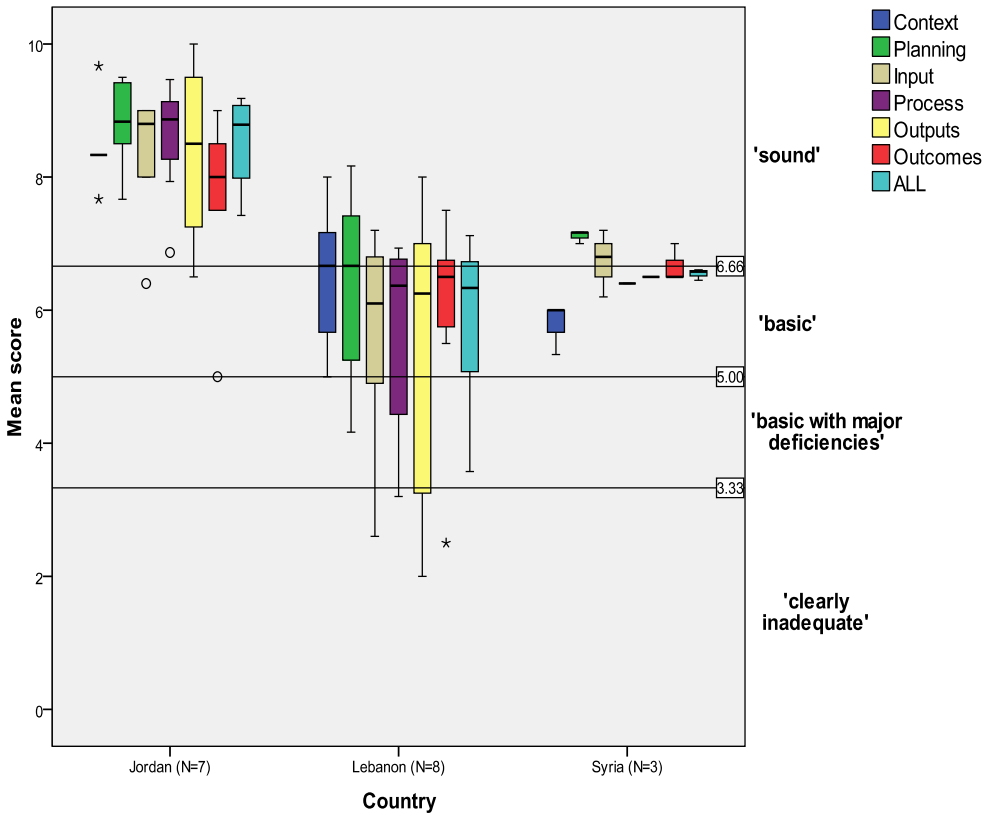

Fig. 4. Distribution of mean scores for each country across the six evaluative elements, and overall mean score. Note: Mean scores <3.33='clearly inadequate management'; 3.33-5.00='basic management with major deficiencies'; 5.01-6.66='basic management'; >6.66='sound management'.

When we calculated the mean scores for the 33 headline indicators, clear patterns emerged in which 4 of 6 *planning* indicators were among the 7 highest scoring indicators (Table 6).

Headline Indicator	Element	Mean	S.D.
'Sound management' [score >6.66]			
Protected area gazettal (legal establishment)	Planning	8.67	2.114
Level of significance	Context	8.39	.916
Adequacy of relevant and available information for management	Input	8.11	1.079
Appropriateness of design	Planning	8.06	.873
Tenure issues	Planning	7.94	2.127
Research and monitoring of natural/cultural management	Process	7.83	1.790
Adequacy of protected area legislation and other legal controls	Planning	7.33	1.495
Threat monitoring	Process	7.33	2.249
Conservation of nominated values—condition	Outcomes	7.17	1.618
Management effectiveness evaluation undertaken	Process	7.11	2.423
Involvement of communities and stakeholders	Process	7.06	2.209
Effectiveness of governance and leadership	Process	7.06	1.697
Management plan	Planning	7.06	2.508
Staff/other management partners skill level	Process	6.94	1.862
Natural resource and cultural protection activities undertaken	Process	6.94	2.508
Adequacy of staff training	Process	6.89	1.937
Effectiveness of administration including financial management	Process	6.83	1.654
Extent and severity of threats	Context	6.83	1.689
Results and outputs produced	Outputs	6.78	2.238
Adequacy of building and maintenance systems	Process	6.78	1.734
Communication program	Process	6.78	1.833
Adequacy of human resource policies and procedures	Process	6.67	1.749
Achievement of set work program	Outputs	6.67	2.223
Appropriate program of community benefit/assistance	Process	6.67	2.058
Adequacy of infrastructure, equipment and facilities	Input	6.67	1.680
'Basic' management [score = 5.01 – 6.66]			
Security/reliability of funding	Input	6.56	2.455
Adequacy of current funding	Input	6.56	2.229
Visitor management (visitors catered for and impacts managed appropriately)	Process	6.56	2.455
Adequacy of staff numbers	Input	6.50	2.455
Effect of park management on local community	Outcomes	6.39	2.279
Adequacy of law enforcement capacity	Process	6.28	2.347
Constraint or support by external political and civil environment	Context	6.17	2.093
Marking and security or fencing of park boundaries	Planning	5.67	3.068

Table 6. The evaluative element, mean and standard deviation (S.D.) for each headline indicator analyzed.

The only planning indicator which was clearly deficient was 'Marking and security or fencing of park boundaries', ranking last in the list and particularly problematic amongst PAs in Lebanon and Syria. Other relatively weakly scoring indicators related to funding, staffing, and law enforcement capacity, as well as 'external political and civil environment' support.

When we explored correlations between each headline indicator and the overall management effectiveness score, 7 indicators had Pearson's *R* values >0.90 (Table 7). In addition, we investigated which indicators were most positively correlated with the two *outcome* indicators, which reflect whether the long-term objectives are met. Two of the indicators highly correlated with the overall mean score were also highly correlated with 'conservation of values', i.e. 'Adequacy of human resource policies and procedures' and 'Appropriate program of community benefit/assistance' (see Table 7). However, indicators correlated with 'effect on community' were less clear with all *R* values less than 0.45, indicating relatively weak overall associations with this *outcome*. Finally, we tested whether area of PA and year of national designation were correlated with mean scores. Only the latter was found to be significantly correlated, i.e. higher effectiveness scores were found to be associated with older PAs (R=.40, p=.05).

Headline Indicator	Corr. with Mean	Corr. with conservation of values (outcome)	Corr. with effect on community (outcome)
Adequacy of human resource policies and procedures	**.966**	**.915**	.300
Appropriate program of community benefit/assistance	**.941**	**.919**	.205
Adequacy of infrastructure, equipment and facilities	**.938**	.844	.312
Conservation of nominated values—condition	**.930**	--	.173
Effectiveness of administration including financial management	**.921**	.846	.221
Research and monitoring of natural/cultural management	**.915**	.863	.291
Adequacy of protected area legislation and other legal controls	**.911**	.802	**.357**
Adequacy of staff training	.897	.851	.197
Achievement of set work program	.889	**.883**	.155
Staff/other management partners skill level	.888	.882	.324
Results and outputs produced	.888	**.888**	.145
Marking and security or fencing of park boundaries	.887	.770	.289
Communication program	.884	**.886**	.205
Adequacy of building and maintenance systems	.866	.790	.306
Tenure issues	.829	.738	**.393**
Adequacy of law enforcement capacity	.826	.808	.144

Headline Indicator	Corr. with Mean	Corr. with conservation of values (outcome)	Corr. with effect on community (outcome)
Management effectiveness evaluation undertaken	.822	.655	.237
Visitor management (visitors catered for and impacts managed appropriately)	.818	.775	.117
Threat monitoring	.805	.695	.145
Involvement of communities and stakeholders (planning, decision-making etc.)	.778	.738	.194
Security/reliability of funding	.764	.805	**.338**
Protected area gazettal (legal establishment)	.758	.722	**.444**
Adequacy of current funding	.750	.772	**.441**
Natural resource and cultural protection activities undertaken	.740	.611	.138
Adequacy of staff numbers	.739	.777	.331
Effectiveness of governance and leadership	.709	.639	.009
Constraint or support by external political and civil environment	.701	.634	.245
Adequacy of relevant and available information for management	.582	.494	-.066

Note: Indicators highly correlated (R>0.90) with overall mean are **bold**; the five most highly correlated items with the two *outcome* indicators are also **bold**. Only 28 highest correlations (R>0.50) are shown.

Table 7. Correlation of headline indicators with overall mean, and *outcomes* (conservation of values; effect on community).

7. Discussion

The discussion of our results follows the framework of the analysis made by Leverington et al. (2010) in the aim of establishing a comparison of management effectiveness results between the studied Arab Levant countries and global results.

7.1 How effective is protected area management?

Our results show that, of the three countries studied, only Jordan is performing significantly better than the global average in managing PAs. None of the analyzed PAs scored in the 'clearly inadequate' management range (<3.33), 11.1% scored in the 'basic with major deficiencies' range (3.33-5.00), 38.9% in the 'basic' range (5.01-6.66) and 50% in the 'sound' management range (>6.66) (Fig. 2); this compares with global score proportions of 13%, 28%, 37%, and 22%, respectively (Leverington et al. 2010). Jordan consistently showed management effectiveness scores in the sound management range, while Syrian scores were concentrated in the basic performance, and Lebanon showed the greatest variability encompassing all ranges. These performance levels can be interpreted in light of existing literature and context. The Jordanian PAs management seems to have a more rigorous monitoring system for management effectiveness since the evaluation has been carried out

previously (RSCN, 2008) using the METT tool, and the 2008 evaluation results created the opportunity for managing institutions (including RSCN) to apply adaptive management approaches and improve their management effectiveness results by 2011 (RSCN, 2008). Although not directly comparable, the results of METT evaluations in Jordan in 2008 had already shown positive results with no major deficiencies in management effectiveness of PAs studied, which implies that our evaluation provides an update, and confirms their strong performance (RSCN, 2008). The limitation of our results for Jordan is that two established PAs managed by ASEZA were not part of the analysis; however the absence of these areas is estimated to have minimally impacted the general evaluation, as they had comparable scores to the other Jordanian PAs in 2008 (RSCN, 2008).

Lebanon shows an interesting range of scores which can be attributed to several factors. This includes the fact that Lebanon has a special form of management of Nature Reserves which falls under the general jurisdiction of the MOE, while actual management effectiveness depends mostly on direct management capacities and resources. This is because the MOE acts mostly as a governance and administrative centre for Nature Reserves and has a very limited budget for reserve management (channeled through their respective managing institutions) that depends mostly on project (foreign) funding for developing management systems and improving effectiveness. Moreover, the sample taken from Lebanon is more varied than Jordan and Syria, as one biosphere reserve (Jabal Rihane) is a site protected by the Shiite Hezbollah party, and is a unique case of PA since it lacks any form of institutionalized management. The generally positive results obtained in Lebanon reflect local and national efforts of the MOE and mostly NGOs to protect valuable sites by persevering in attracting international funds and adhering to international program requirements (UNESCO MAB program) and standards.

Syrian PA management effectiveness scores showing results in the 'Basic' range can be misleading because of the very small sample size (3 of 27 established PAs). Since the responses were obtained specifically on the three most recognized PAs in Syria, which have benefited from the UNDP-GEF management development projects, and since Syria still lacks national management plans and effectiveness monitoring tools, the positive results obtained in our study for Syria could be an overestimate of management effectiveness across all 27 PAs. A more comprehensive research (including complementary quantitative data) on a larger and more representative sample would be needed to confirm the results obtained.

7.2 Which aspects of management are most effective?

According to our results, the most effective aspect of management is *planning*. This finding is consistent with the global survey results (Leverington at al., 2010), where the same *planning* indicators appeared in the top 7 scores, with the exception of 'Marking and security or fencing of park boundaries' which was the lowest scoring indicator in our study (Table 6). Syria and Lebanon have particularly noted this problem. In the case of Lebanon, this was reported earlier by Matar & Anthony (2010), and there appears to be a general absence of planning for this specific objective which may be due to complicated administrative and practical land tenure issues. Hence, for Lebanon and Syria, this problem might originate from the lack of national prioritization for this issue by local authorities governing the PAs (Ministries).

Planning indicators with particularly high scores include 'Protected area gazettal (legal establishment)', 'Appropriateness of design', 'Tenure issues', and 'Adequacy of protected area legislation and other legal controls'; which is consistent with the selection criterion for our study sample, i.e. "the presence of a national legal designation and/or international designation" (see Methods). Relatively weakly scoring indicators constitute *input* indicators, primarily those related to funding and staffing constraints, and 'adequacy of law enforcement capacity' (*process*), as well as 'external political and civil environment' constraints (*context*). This is likely due to the instability of funding for PAs, where there is high reliance on external financing institutions that have local/regional agendas and specific budgets under their agendas/programmes of work. This translates into an absence of highly-skilled persons being attracted to PA management positions which, in turn, decreases capacity for effective management including law enforcement. The low capacity of law enforcement at the managing institution level is also exacerbated by a generally weak enforcement at the national level reported in Lebanon (MOE-L et al., 2009).

7.3 Which factors are most related to overall effectiveness and successful outcomes?

Individual headline indicators most strongly correlated to overall management effectiveness (as reflected in item-total correlations in Table 7), show interestingly few similarities with the global survey results (Leverington et al., 2010). Only 'Effectiveness of administration including financial management' and 'Adequacy of infrastructure, equipment and facilities' scored in the top 5 of both studies. Indeed, 2 of our top 3 indicators ('Adequacy of human resource policies and procedures' and 'Conservation of nominated values-condition'), are not even included in the list of indicators in the international evaluation with $R>0.5$; our second most highly correlated outcome 'Appropriate program of community assistance' is only 19th in the list of indicators most correlated to outcomes globally as per Leverington et al. (2010). This highlights strengths that may be specific to the Levant region and could be developed and leveraged in the future. They could also provide interesting case-studies for the rest of the region (and others), to be more closely studied in the perspective of providing learning experiences for countries or regions that perform poorly in these areas/indicators.

Second, only one of the five most highly correlated indicators to either of the *outcomes* in our study scored highly in the global study, i.e. 'achievement of set work program', which was highly correlated with the 'conservation of values' *outcomes* indicator. The disparity observed between regional and global results provides an interesting case for further research in order to gain a deeper understanding of the relationship between these two *outcomes* indicators and overall management performance in specific PAs.

Finally, we found that those sites which were designated earlier had higher mean management effectiveness scores, a result which is consistent with the global study (Leverington et al., 2008). Since PAs of the Levant region are at various stages of designation and evolution, older PAs with more resource availability have had the time and capacity to develop, implement, and monitor their management plans, while others are still drafting them or planning to do so. This demonstrates the necessity to conduct regular PAME assessments to track effectiveness levels at various development stages within an individual site, and/or group of sites.

8. Conclusion

8.1 Research outcomes and contribution

This research is innovative as it provides the first PA management effectiveness evaluation on a regional scale in the Arab and Levant region and the first performance evaluation using the recently developed set of indicators by Leverington et al. (2010). Our results interestingly show a better than average performance score than the global results, with a remarkable 50% of surveyed PAs from Syria, Lebanon and Jordan scoring in the 'Sound management' range. Although this high score is mainly driven by consistently high scores in Jordan, Lebanon has also shown positive results and the small sample size of Syria consistently scored in the 'Basic' management range despite the lack of national monitoring strategies and action plans for systematic PAs management effectiveness evaluations in both Syria (SAR et al., 2009) and Lebanon (Matar & Anthony, 2010).

It is important to keep in mind that other factors – not studied in this research - can greatly affect the management performance difference between Jordan on one side, and Lebanon and Syria on the other, i.e. local political and economic stability. Lebanon has been on a long track of political instability, and was more recently shaken by the intense 2006 war against Israel; while Syria is currently witnessing a revolutionary transition that is dramatically destabilizing the country. This is an important factor that could be the subject of another study on the impact of national security and political stability on PAs management performance. Hanson et al. (2009), in their global review of warfare within biodiversity hotspots, point out that armed conflict often plays out in remote areas, and can lead to direct effects including ineffectiveness of PA boundaries, the withdrawal of PA staff, suspension of conservation activities, and an increase in uncontrolled hunting and grazing, the latter of which has already been identified in Lebanon (Matar & Anthony, 2010); MOE-L et al., 2009). Moreover, highlighted indirect effects include the emphasis on military spending at the expense of natural resource management. Our studied region is not immune to these effects and the baseline logic behind it is that the stability in the Hashemite Kingdom of Jordan creates a better enabling environment for managing institutions (RSCN and ASEZA) to advance and develop their PAs frameworks and performance.

8.2 Research limitations

Not unlike similar studies where respondent scoring is utilized to ascertain data on management effectiveness, our study is admittedly limited by the *subjectivity* of our respondents (Cook & Hockings, 2011). We have made every attempt to collect data from those respondents whom we believed had the best knowledge of the management indicators we were assessing, and with the *lack of published information in the region* (either qualitative or quantitative), this is a factor which we could not control for and which may be liable to overstating (or understating) performance by the individual assessors (Burgman, 2001). Moreover, our *PA selection criteria* deliberately excluded those sites which are under some level of 'protection', but are not formally recognized Reserves (e.g. *himas* in Lebanon, *rangelands* in Syria), which also limits the comparability with the global results of Leverington et al. (2010). Nonetheless, we use Leverington et al.'s study as the only available benchmark by which to make some comparisons on the effectiveness of our region to the global scene. Further, our results are consistent with the only similar studies or assessments which have been conducted in Lebanon (Matar & Anthony, 2010) and Jordan (RSCN, 2008), and issues identified in national reporting to the CBD by all three countries.

The above limitations are also exacerbated by simply the *lack of qualitative data* on management effectiveness in the region. This would be best addressed by conducting lengthy interviews or workshops with PA management staff, but was outside the scope of our study. This was compounded by the relatively low response rate from the Syrian PAs which, in all likelihood, distorts the national picture, particularly as our three responses were from PAs that have had the benefit of developed management structures (SAR et al., 2009). Without delving into the opinions of management staff on what obstacles or opportunities influence the effectiveness of the various indicators, we are limited in our analyses.

Despite these limitations, however, our study does provide a rapid and useful assessment of the management effectiveness of 18 PAs in Jordan, Lebanon, and Syria, and offers a platform for further research on this topic in the region.

8.3 Recommendations

With the aim of making a concrete contribution to the conservation field in the countries studied, and to address the need to draw regional lessons from PAME studies (Hockings et al., 2006), we recommend the following:

1. *Develop and adopt adapted management effectiveness evaluation tools that are based on the 6 evaluative elements, and integrate them into monitoring programmes for PAs in Syria and Lebanon by their respective Ministries of Environment (and/or other responsible governance institutions).* As Hockings et al. (2006: 48) recommended, "Evaluation of management effectiveness should be incorporated into the core business of protected area agencies." In the case of the Levant region, the superior performance of Jordanian PAs relative to Lebanon and Syria could be partly attributed to an already existing (and implemented) effective monitoring tool in Jordan. We believe that this finding could eventually provide an incentive for Lebanese and Syrian Authorities to start implementing a similar internationally recognized and standard monitoring tool for evaluation of management performance for the PAs under their jurisdictions. Our research results confirm other studies' findings, which suggest that comprehensive evaluations based on the WCPA Framework (the 6 elements) such as the one performed in Jordan, (i) provide a good overview of strengths and weaknesses of individual PAs, (ii) help identify management gaps, and (iii) can lead to more realistic recommendations and adaptive management actions to make improvements in the system (RSCN, 2008). This is one realistic recommendation that our research advances, since the implementation of such tools does not appear to be outside the scope of local institutional capacities (Matar & Anthony, 2010).
2. *Complement PAs national monitoring strategies with appropriate policies at the central decision-making institutional level.* For Syria, Lebanon and Jordan this would help to consolidate their implementation and ensure enforcement of policy by local authorities. As reflected in our study results, political support was part of the weakest scoring indicators that needs to be improved in the region. Creating and enforcing policies that would make management effectiveness evaluations a 'requirement' could be one avenue for local governments to address this issue, provided that this would be accompanied by capacity-building for managing institutions to carry out this obligation.
3. *Develop and adopt management effectiveness evaluation plans and monitoring programmes at individual PA levels for PAs with independent management systems (where existing national PA management strategies don't apply).* For example, in the case where Biosphere Reserves

with no legal national designation are independently managed by NGOs not governed by national monitoring strategies, it is advisable that these institutions develop their 'own' management evaluation plans and long-term monitoring strategies until the reserves acquire a national legal structure. Ideally, for continuity and more seamless transitions in implementation by different management structures, these would be based on existing and standardized evaluative tools, such as the ones based on the IUCN-WCPA Framework. Moreover, as Hockings et al. (2006: 49) state: "Evaluations that are integrated into the managing agency's culture and processes are more successful and effective in improving management performance in the long-term." Hence, there is value in adapting and integrating the chosen evaluation plans to existing management structures and processes.

4. *Consolidate the management structure and capacities of Biosphere Reserves by assigning a nationally recognized legal structure/designation*. This process would entitle Biosphere Reserves to local managerial arrangements, and align them with local policy requirements. As emphasized by Stoll-Kleemann et al. (2008: 11), "In order to effectively manage and conserve biodiversity in-situ, protected areas must be legally established, and management actions and measures must be implemented."
5. *Increase cooperation and networking between Lebanon, Syria, and Jordan for sharing experiences and learning best practices on PA management and monitoring.* This recommendation is aligned with Hockings et al. (2006: 49) call to "... learn from others and use or adapt existing methodologies if possible." The successful use of the METT tool in Jordan in 2008 reflects the existence of know-how and required skills in this region for the implementation of such tools. Hence, increased cooperation and sharing of experiences could foster the required transfer of skills and knowledge for successful implementation in Syria and Lebanon as well. Management effectiveness evaluations are not a 'one-time' process and need to be integrated into an overall management system where they would ideally be implemented on a regular basis, providing useful feedback for an effective overall adaptive management approach (Salafsky et al., 2001). Hence, we recommend that Jordan continues implementing (and adapting) the METT tool on a regular basis to monitor trends in its PAs management effectiveness; while Syria and Lebanon plan for regular evaluations when related strategies are developed and implemented.

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