

Evaluating the Management Effectiveness of Five Protected Areas in Taiwan Using WWF's RAPPAM

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Abstract This study adopts and modifies the WWF Rapid assessment and prioritization of protected areas management methodology (RAPPAM) to evaluate the management effectiveness of five protected areas in Taiwan. The results indicate that, unlike the situation in most developing countries, the threats and pressures faced by protected areas in Taiwan come mainly from the outside—with pollution as the most common pressure and threat, and difficult for their management authorities to deal with effectively. The categories and extent of these pressures and threats are related to remoteness and geographic location of the protected areas. All five cases under study reveal a similar management approach, clear management goals, adequate basic infrastructure and clear management decision-making; on the down side, however, all of them suffer from the lack of an effective comprehensive management plan, inadequate or poor quality human resources and insufficient funding. The present study suggests that first priority should be given to strengthening management planning in order to improve management effectiveness of protected areas in Taiwan. The adjustment made to RAPPAM in this study was to amend

and take the format of the management plan as the basis for evaluation material preparations and open the discussion to encourage stakeholders' participation to open the dialogue among them. The results indicate that, although the system evaluation design still has some constraints, the quality of information collected is improved and can respond more directly to the specific demands of the respective areas.

Keywords RAPPAM · Site evaluation · Stakeholder · Community participation · Pressure and threat analysis · Management planning

Introduction

While the extent of protected areas now exceeds 12 % of lands in the world and still continues to increase (Chape and others 2005; McNonald and Boucher 2011), global biodiversity is still degrading rapidly, thus there are more and more pressures from the public which insists on the effectiveness and accountability of their protection (Hosking and others 2006). The international conservation community has been keen to evaluate the long-term effectiveness of protected areas at least since two decades ago (Hocking and others 2006).

Management effectiveness evaluation (MEE) is defined as “the assessment of how well the protected area is being managed – primarily the extent to which it is protecting values and achieving goals and objectives” (Hockings and others 2006, p xiii). In recent years, many countries and conservation organizations have developed a variety of methodologies for assessing management effectiveness of protected areas. By assessing management effectiveness, the management authority of a protected area can be advised how to (1) allocate resources more effectively,

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(2) enable and support an adaptive management approach, (3) promote accountability and transparency, and (4) help involve stakeholders (especially local communities) (Hockings and others 2006, p 15).

In 2000, the IUCN World Commission for Protected Areas (WCPA) published the WCPA Framework for evaluating management effectiveness of protected areas based on project-cycle management with six elements—context, planning, inputs, processes, outputs and outcomes (Stem and others 2005; Hockings and others 2000). The framework has gained wide approval in international conservation community and spawned the development and tests of multiple evaluation methodologies (Stem and others 2005). Management cycle has thus become a key consideration in evaluating protected area management effectiveness (Leverington and others 2008). Among all the available methods, the most popular one at present is the WWF Rapid assessment and prioritization of protected areas management methodology (RAPPAM), which allows rapid analysis of the overall management effectiveness of the protected areas, identification of management strengths and weaknesses, and analysis of threats and pressures (Leverington and others 2010). So far, more than 40 countries and 1,000 protected areas have been assessed by RAPPAM (Leverington and others 2010). Several detailed assessment reports have been published in English, and are accessible online—Bhutan (Tshering 2003), Cambodia (Lacerda and others 2004), China (Li and others 2003), Mongolia (Batsukh and Belokurov 2005), Nepal (Sushila 2006), Romania (Stanciu and Steindlegger 2006), Russia (Tyrlyshkin and others 2003) and South Africa (Goodman 2003b). More cases of RAPPAM can be found at the WWF website (wwf.panda.org/what_we_do/how_we_work/conservation/forests/tools/rappam) and the World Database on Protected Areas (www.wdpa.org/ME/Default.aspx).

RAPPAM mainly involves using a set of quick questionnaires to collect and analyze information. The questionnaires categorize the six elements of the WCPA Framework into three parts—context, management effectiveness and systematic analysis. The effectiveness assessment is to review the management processes, while the systematic assessment involves observing system-level design, protected area policies and policy environment (Ervin 2003a). It assesses the pressures and threats, the vulnerability and the biological and socio-economic importance of the protected areas for the context (Ervin 2003a). The pressure and threat analysis is a part of context assessment. ‘Pressures’ refer to decisive (negative) impacts, activities or events impacting the integrity of the protected areas in the past five years; ‘threats’ here refer to those existing pressures which may persist in the next five years, and to those potential new ones which may occur should the condition remain the same (Ervin 2003a).

Since different protected areas of different background and situations face a variety of pressures and threats, Salafsky and others (2008) developed a unified classification of pressures and threats to facilitate information sharing and comparison among cases. While some pressures and threats of protected areas, including such illegal activities as poaching, logging, collecting, fishing and ecosystem degradation, commonly occur on site; many other major threats come from outside and cannot be dealt with directly by management (Davey 1998; Worboy and others 2006). Consequently, recognition of the dependence of protected areas on their surrounding landscapes and identification of necessary cross-border interactions are both crucial for controlling, decreasing and finally eliminating pressures and threats to protected areas (Borgström and others 2011). Nevertheless, the management plan for a protected area remains the principal mechanism for planning for and responding to pressures and threats (Davey 1998; Worboy and others 2006).

In principle, RAPPAM is aimed mainly at the IUCN I–IV type protected areas managed by government. Usually used as a comparative assessment tool for several protected areas in one selected area (e.g., a watershed, a province or a country), RAPPAM can indicate the comparative needs and conservation priorities among the protected areas; but, when applied in on-site evaluation, specific criteria and indicators need to be developed (Ervin 2003a).

One of key steps in implementing RAPPAM is getting the questionnaire filled out by holding participatory workshops. Protected area managers, policy makers and other stakeholders, such as local or international NGOs, academics, local resource users and residents, may be invited to join the workshops. Such participatory workshops allow the various stakeholders to communicate their views regarding the questions in order to facilitate careful assessment based on the participants’ consensus (Ervin 2003a). Marques and others (2011) pointed out the importance of a participatory process to involve local stakeholders to better understand the evaluation and respond to express their concerns. Nevertheless, some scholars are concerned that RAPPAM may reflect an expert-oriented approach because it relies too heavily on information that is possessed by the management authorities (Bertzky and Stoll-Kleemann 2009; Stoll-Kleemann 2010; Cook and Hockings 2011).

Academics and practitioners believe that RAPPAM’s advantages are: (1) easy adjustment for cases of different contexts; (2) inclusion of all six elements of the WCPA framework; (3) provide simultaneous collection of general and comparative points of view; (4) enable identification of weaknesses and strengths, and provide transparent information for resource allocation; and, (5) enable assessment of protected area systems through collection of site-level information (Goodman 2003a; Leverington and others

2008). The limitations of RAPPAM include: (1) the lack of in-depth analysis, particularly for the outcomes of management; (2) the difficulty of providing detailed information for individual site assessment; (3) strong subjectivity caused by limited participants and heavy dependence on authorities; (4) the unsuitability of application to protected areas with different objectives; and (5) its inapplicability, as yet, to marine protected areas (Goodman 2003b; Leverington and others 2008; Quan and others 2009; Stoll-Kleemann 2010). Furthermore, RAPPAM, like other assessment tools, requires accurate information. The quality of information will affect its effectiveness (Ervin 2003b; Cook and Hockings 2011). Regarding information, Leverington and others (2010) argue that integrating detailed monitoring, situation analysis and management effectiveness information may efficiently build up links with management and generate positive feedback. Also, in situations where information is not easily accessible or widely distributed among stakeholders of protected areas, including the results of the evaluation, the effectiveness and quality of evaluation, accountability and transparency are difficult to ascertain (Stoll-Kleemann 2010). Finally, while most applications of RAPPAM involve adherence to a tight agenda (Leverington and others 2008), time and cost both remain crucial for the quality of the evaluation (Lu and Wang 2006).

Taiwan has been setting up protected areas since the 1970s; however, there is no clear information on the effectiveness of management of these areas (Lu and Wang 2006). Consequently, the present study was the first to explore the management effectiveness of protected areas in Taiwan. Five protected areas from three different protected area systems were selected on the basis of their history of establishment, management status and availability of data. We applied RAPPAM, the most popularly used method for present site-level evaluation and for possible system-level evaluation in the future. In addition, we made adjustments to RAPPAM to improve its potential for individual evaluation and to ensure that the results would be more directly responsive to management requirements.

Methods

Study Areas

The study areas for this research were: the Wu-Wei-Kang Wildlife Refuge (WWK), the Tamsui River Mangrove Nature Reserve (TRM), the Hsinchu City Coastal Wildlife Refuge (HCC), the Rueiyan River Major Wildlife Habitat (RRM) and the Dawu Taiwan Keteleeria Natural Protected Area (DTK) (Fig. 1). We evaluated WWK in 2005–06, and implemented the other four in 2008. Basic information

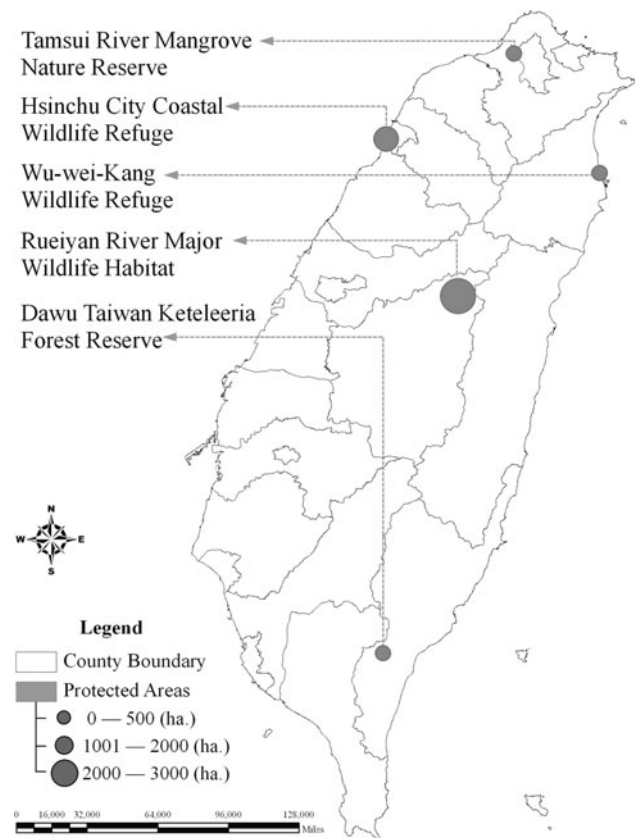


Fig. 1 The localities and coverage of the five case studies

about these areas is listed in Table 1. Of these five protected areas, two are forest-type (the RRM and the DTK), and three are wetland-type; but all five are classified as IUCN I–IV protected areas. Legally, these five protected areas are divided into three groups. The first group is Nature Reserve, designated by the Cultural Heritage Preservation Act. Access to the reserve is limited to academic research and educational purposes; any use of or disturbance to the local ecosystems and wildlife habitats is strictly prohibited (Article 84 of the Cultural Heritage Preservation Act). The second group is the Major Wildlife Habitats and the Wildlife Refuges under the Wildlife Conservation Law. The Major Wildlife Habitats are designated by the Council of Agriculture, Executive Yuan (COA). These areas are eligible for further development if the COA approves the application, but such activities must be shown to have minimal impacts on the wildlife habitats and the area itself (Article 8 of the Wildlife Conservation Law). The Wildlife Refuges are areas in need of protection within the Major Wildlife Habitats. The management authorities must draw up conservation plans to develop a zoning system, carry out conservation activities and regulate use of natural resources in the refuges (Articles 10 and 11 of the Wildlife Conservation Law and its Enforcement Rules). The third group, Natural Protected Area, is

Table 1 Background information of five case studies

Name of protected area	WWK	TRM	HCC	RRM	DTK
Size (ha)	101.62	76.41	1,600	2,574	5.04
Year of establishment	1993	1986	2004	2000	2006
Legislative base	Wildlife conservation law	Cultural heritage preservation act	Wildlife conservation law	Wildlife conservation law	The forest act
Local authority or management agency	Yilan County Government	Luodong Forest District Office (Forestry Bureau)	Hsinchu City Government	Nantou Forest District Office (Forestry Bureau)	Taitung Forest District Office (Forestry Bureau)
Main value (conservation objectives)	Key wetland of migrating waterfowl in NE Taiwan	The largest Kandelia mangrove forest in Taiwan	The largest coastal wetland in northern Taiwan	Original broad-leaved forest	<i>Keteleeria fortunei</i> (a rare and protected tree species)
Annual budget / million TWD*	2.0 – 2.5	3.45	3.8	0.25	0.25
Forestry Bureau					
County government	0.5–0.6	–	0.65	–	–
Total	2.5–3.1	3.45	4.45	0.25	0.25

WWK Wu-Wei-Kang wildlife refuge, TRM Tamsui river mangrove nature reserve, HCC Hsinchu city coastal wildlife refuge, RRM Rueiyan river major wildlife habitat, DTK Dawu Taiwan Keteleeria natural protected area

* One USD is equal to about 30.5 TWD

established under the Forest Act with the aim of maintaining forest ecosystem and environments and preserving biodiversity (Article 17-1 of the Forest Act). Besides that, it can be used for education, scientific research as well as activities for local community development through limited use of natural resources in the protected areas, according to the Rules of Establishing and Management for Natural Protected Areas.

Despite their different legal bases and diverse management purposes and methods, the five protected areas share some features in common. Strictly speaking, none of them has its own independent administration office (management unit), not to mention a dedicated manager. The so-called “managers” they do have are also tasked to manage other conservation-related endeavors in the jurisdictional region in which the protected areas are located. For each sample protected area, only about one to three personnel are in charge of site patrol; volunteers are enlisted to serve as guides and interpreters. Typical management practices in RRM and DDK include routine patrols, educational guiding and research. The other three protected areas (WWK, TRK and HCC) have adopted some active management measures, including habitat restoration, facilities maintenance and volunteer recruitment and training. Since these five protected areas have different objectives and contexts, this study looks to the general trends instead of detailed comparisons among them, and analyzes and interprets evaluation results.

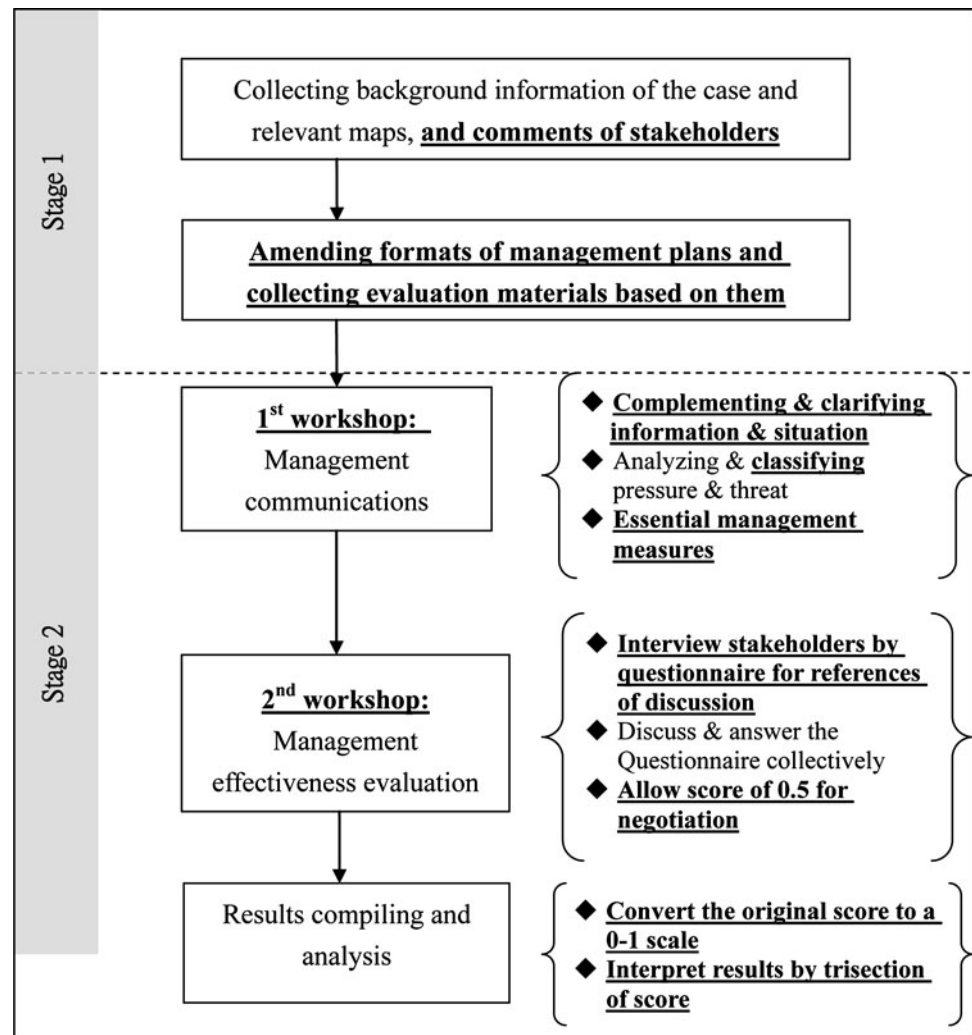
Implementing RAPPAM

With the aim of satisfying our specific enquiry goals and improving management at site level, we took into account the management planning principles suggested by Davey (1998) and Worboy and others (2006) and held discussions with governmental officers to adjust RAPPAM’s implementation. The implementation logic and rules of this study are as follows: clarify situations, identify pressures and threats, develop feasible responsive measures, and set up work priorities given the limitations of our human resources and budget (Fig. 2). The adjustments focused on integrating the participation of stakeholders, particularly local communities, in the management planning process, as recommended by Lockwood and others (2006).

The implementation processes of RAPPAM include determining assessment scope, assessing existing information, administering rapid assessment questionnaire, analyzing results and identifying next steps and recommendations (Ervin 2003a); hence, this study divided the entire series of processes into two stages: data collection and participatory workshops.

For data collection, we examined our first-hand founding from the first case WWK, and reviewed documents of the other four cases, except for RRM which is not legally required by the Wildlife Conservation Law to develop a management plan. The finding suggests that all existing management plans have paid only little attention to identify

Fig. 2 The evaluation process of management effectiveness for protected areas by RAPPAM in this study. The *boldface* and *underlined* ones are those adjusted by this study



pressures and threats and had poor links between objectives and management actions. Therefore, this study amended the format of management plan for each kind of protected area system based on the management cycle and used the collected information as the materials of the evaluation workshops. For this amended format, the information resources we look into include all background literature, statements, plans (including management plans), projects, maps, biological resource surveys and related research reports or journal articles, as well as stakeholder interviews, including officers of authorities and relevant agencies, academics, conservation organizations and community representatives to gather their perspectives and opinions concerning the protected area and its management.

Each workshop had about 9–17 participants, chosen from the interviewees to include as many different categories of stakeholders as possible, particularly, individuals or representatives from local communities. Due to the complexity of WWK, TRM and HCC in terms of stakeholders and management issues, the workshops were held twice, while there was only one held by both RRM and

DTK because of their limited accessibility and simple management issues. The first workshop was held to discuss the status of the protected area, to conduct the pressure and threat analysis and to develop essential management measures which would be responsive to the pressures and threats. For analysis, the pressures and threats pointed out by the stakeholders of each protected area were classified using the categories of Salafsky and others (2008).

For the second workshop, we interviewed stakeholders with the RAPPAM evaluation questionnaire on management effectiveness beforehand as reference for the workshop discussion, and as a way to shorten the processes. While original scores for each question were 1 to 4 (Ervin 2003a), half points (0.5) were introduced here to resolve differences in opinion among participants in the evaluation process. The final scores were converted from 4-point Likert Scale to 7-point Likert Scale in order to be able to award half point for interval.

Regarding the result analysis, to have a more uniform standard for MEE result interpretation, this study adopted

Leverington and others method (2010) and converted the original score to a 0–1 scale. To make comparisons between different “themes” and “elements” of the questionnaire, we averaged the scores of the questions from each “theme”. In accordance with Leverington and others (2010), we also specify that if the scores were lower than 1/3 (<0.33) or higher than 2/3 (>0.67), the management process would be considered inadequate or adequate, respectively. However, a score between the two ends meant that the protected area has basic management functions, but needs considerable improvement. Since most scores fell into this category, those between 0.33 and 0.5 can be regarded as basic but with significant deficiencies.

Results

Pressures and Threats

The results of the threat and pressure evaluations of the five protected areas revealed that four out of five protected areas are under nine kinds of threats and pressures, including residential and commercial development, agriculture and aquaculture, transportation and service corridors, biological resource use, human intrusions and disturbances, natural system modifications, invasive and problematic species and genes, pollution, climate change and severe weather (Table 2). DTK is the only exception as it does not have any external threats and pressures, but it faces the issues of low

reproduction of *Keteleeria fortunei* and natural landslides occurring in the habitat. Besides, the participants of workshops also recognized some pressures and threats related to management issues, such as low community supports, disputed property rights, insufficient human resources and funding, insufficient information and inadequate design. Although these pressures and threats are excluded by the Salafsky and others (2008); to avoid contradiction with the RAPPAM questionnaire, we still kept the records as reference for interpretation of evaluation results.

The perception of the level of threats and pressures in each individual protected area is affected by its objectives, geographical position as well as the viewpoint of the evaluators. As a result, the scores vary greatly ranging from 50 to 158 (pressure) and 76 to 169 (threat) (Fig. 3). Based on the categories, the most severe pressure faced by the four protected areas is pollution. This is also the most serious threat; the main factors for pollution include household sewage and waste water, industrial effluents, and garbage and solid waste. Natural system modifications include the construction of dams and dykes. Residential and commercial development include urban sprawl and development of industrial and commercial areas. Agriculture and aquaculture include farming operations. Biological resource use includes fishery operations.

Management Effectiveness Evaluation

The converted scores for the results of the MEEs, including the planning, inputs, processes and outputs of the five protected areas are as follows: DTK 0.70, RRM 0.62, HCC 0.48, TRM 0.45 and WWK 0.42. This indicates that the management measures taken by DTK are adequate, and RRM's are slightly deficient. For the other three protected areas, although their scores were categorized within the range of 0.33–0.67, their true scores of them were all below 0.5. This shows that there are clear deficiencies in their management (Table 3).

Based on the performance of the various management elements, WWK, RRM and DTK scored the highest in “planning” element, while HCC's score in this element is the second best among its all scores. Under the theme of “management objective” within this element, these four protected areas obtained scores that exceeded 0.67. On the other hand, the five protected areas had varying scores in the elements of “input” and “process.” The other pair of contrasts is that all five protected areas did poorly in the theme of “staff” and “finance” within the “input” element, but they all did relatively well under “basic infrastructures” of the same element. The “management planning” under the “process” element is another evident weakness of all five protected areas—the scores obtained by DTK, RRM and HCC were lower than 0.67, whereas WWK and TRM's 0.33 were

Table 2 The classifications of pressures and threats of five cases studies

Pressures _(p) and threats _(t)	WWK	HCC	TRM	RRM	DTK
Residential and commercial development		0 _(p) + _(t)	+	+	
Agriculture and aquaculture			–	–	
Transportation and service corridors		0 0	+	+	+
Biological resource use		0 0	0 0	0 0	
Human intrusions and disturbance			+	+	+
Natural system modifications		0 0		0 0	
Invasive and other problematic species and genes	+	+	0 0		
Pollution	0 +	+	0 0	+	+
Climate change and severe weather	+	+	0 0		

P.S. Pressure_(p) means the negative factor on the protected area in the past five years
Threats_(t) is the negative factor on the protected area supposedly happened in the following five year

+ increase, – decrease; 0 even

Fig. 3 The classification and extent of the pressures and threats of the 4 case studies (The participants didn't identify any external pressure and threat in the workshop of DTK)

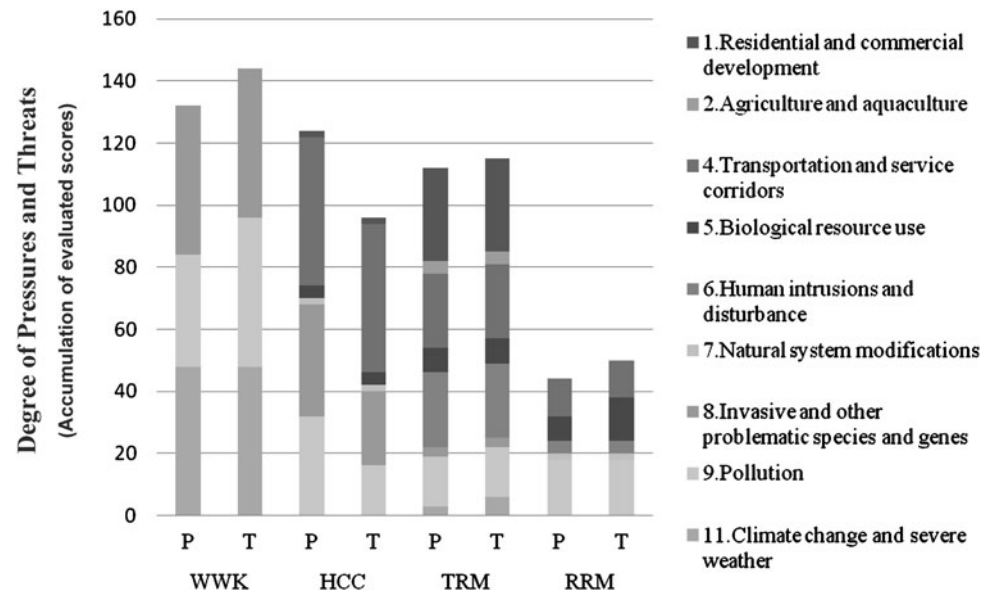


Table 3 The evaluation results of management effectiveness for all 5 case studies

Management elements/themes	WWK	TRM	HCC	RRM	DTK	Average
Planning						
Management objective	0.76	0.40	0.68	0.76	0.92	0.70
Legal protection	0.36	0.52	0.50	0.64	0.88	0.58
Site design and planning	0.26	0.40	0.34	0.72	0.80	0.50
Average	0.46	0.44	0.51	0.71	0.87	0.60
Input						
Staff	0.40	0.32	0.40	0.48	0.44	0.41
Communications and information	0.56	0.52	0.48	0.64	0.72	0.58
Infrastructure	0.60	0.84	0.36	0.92	0.72	0.69
Finance	0.28	0.36	0.26	0.56	0.92	0.48
Average	0.46	0.51	0.38	0.65	0.70	0.54
Process						
Management planning	0.10	0.28	0.48	0.40	0.56	0.36
Decision-making	0.52	0.48	0.72	0.64	0.88	0.65
Monitoring and research	0.34	0.32	0.44	0.48	0.92	0.50
Average	0.32	0.36	0.55	0.51	0.79	0.50
Output						
Management results in recent 2 years	0.44	0.50	0.48	0.60	0.78	0.56
Average	0.44	0.50	0.48	0.60	0.78	0.56
Total average	0.42	0.45	0.48	0.62	0.78	0.55

even far less. Another area of poor performance was in “monitoring, research and evaluation.” Except for DTK, all protected areas had low scores in the range of 0.33–0.67 (<0.5). The “output” element reflects the level of management action, the goal realization and the control of the pressures and threats achieved by the managing units of the protected areas over the past two years. To a certain extent,

the score in this element echoed the evaluation results of the three elements previously mentioned.

Essential Management Measures

The key measures partly being adopted, as suggested by the stakeholders, to tackle the various threats and pressures in

the protected areas included: (1) surveying natural resources and protected area management; (2) monitoring the level of pollution, invasive species and anthropogenic interventions; (3) regularly reviewing the management plans of the protected areas and the competency of the staff; (4) strengthening the support and participation of local community residents; (5) enhancing patrols of the protected areas, and strengthening communications between the agencies. Among them, surveying and monitoring, and local community participation were the most commonly suggested for responding to nearly every kind of threat and pressure mentioned. This shows the underlying importance of these two measures.

Comments of Participants

Mainly in the case of WWK, we interviewed participants, especially the officers responsible for site management, after the evaluation. Most of them supported and recognized the value of this evaluation. Government officers of both central and local authorities reacted positively to the evaluation materials, which made the evaluation processes go smoothly, and in time, the evaluation results could perhaps be the foundation for them to develop a revised version of their management plan. Some argued that it was necessary to have a Chinese guideline to interpret the questionnaire consistently. Also, while there were needs of specific items and ways to overcome threats and to achieve the objectives of the protected areas, the evaluation results could not cover everything they directly wanted. A troubling thing was that a local authority officer commented that the recommendations, such as the major management measures suggested by participants of the workshops, were really meaningless since the budget could cover only a few of these items in the case of HCC. Representatives of local communities expressed their interest in getting involved in the protected area management, particularly the decision-making, in the processes. In the case of WWK, local representatives continued to participate in the second workshop after receiving the positive response of the management authority on their comments during and after the first workshop.

Discussion

Pressure and Threat Analysis and Interpretation

Compiling and comparing the results of pressure and threat analysis, we observed that DTK, as a remote protected area, were spared from most of the external pressures and threats. For the other case studies, which were either near populated areas, development zones or tourist sites,

pollution was the most common pressure and threat, next were transportation and service corridors, invasive and other problematic species and genes, and biological resource use. Among these four case studies, both WWK and RRM were located in rural areas. However, RRM was influenced by neighboring tourist sites which posed several more types of pressures and threats than did WWK. For HCC and TRM, which are located in urban areas, there were more and diversified pressures and threats than for the other three. In this regard, it seemed that the nearer to the urban area the protected area was, the more pressures and threats it would face. As to the degree of pressures and threats, i.e., their accumulation of extent, impact and permanence, the scores of both urban ones, HCC and TRM, were higher than RRM and DTK, except WWK, which was the highest. This might be attributed to a nearby industrial zone, easy access and the vulnerability to climate change at coastal areas. But all in all, from the study, it may be safe to conclude that the more remote the protected area is, the less threatening the pressures are, and the more effective the management can be. Moreover, the geographical location of the site may be a crucial factor in management issue, too.

Compared to protected areas in developing countries, such as, Bhutan, Cambodia, China, and Nepal, where illegal activities, like poaching, fishing, logging and mining, pose the major threats (Lacerda and others 2004; Li and others 2003; Sushila 2006; Tshering 2003), Taiwan with a small land area and high population density, heavy reliance on industry and international commerce, the pressures and threats of its protected areas come mainly from urbanization, intensive industrial activities and development plans in most of the case studies of this study. While these items are closely related to the macro economic and social environments, all protected areas, except the remote ones, may face similar pressures and threats in Taiwan. Further, these pressures and threats from the outside, whose control, minimization and/or elimination is beyond the capacity of authorities for the protected area, as Davey (1998) and Worboy and others (2006) mentioned. Their authorities have to count on some mechanisms which can cross borders, as suggested by Borgström and others (2011); for example, national land use planning and pollution control in step with the process of industrialization and urbanization.

The results of this study also reveal a unique phenomenon—many participants of the evaluation workshops tended to criticize the capacity and attitude of the management authorities and to regard the authority itself as one of the pressures and threats for protected areas. Though this might be attributed to lack of communication and participation mechanisms between the government and other stakeholders in the past, it reveals the differing viewpoints of

different stakeholders and the openness for the evaluation processes. Consequently, this study suggests that it is good to provide opportunities for the participants to comment on the role and position of the management authority before classifying pressures and threats of protected areas by Salafsky and others (2008), in reflecting on the site situations and providing direct feedback to the site management.

Challenges of Protected Area Management in Taiwan

Regarding the management effectiveness of the case studies, the trend of the results inversely correlates to the accumulation of pressures and threats, i.e., the greater the accumulative score of pressures or threats, the poorer the scores for management effectiveness. DTK was the only area to achieve the level of sound management (>0.67). RRM also gained a fairly good score (0.62), a little lower than 0.67. The scores of both urban protected areas, TRM and HCC were not good. The WWK was the lowest one. This means that both remoteness and geographical location of protected areas determine which types of pressures and threats they suffered, and these pressures and threats, subsequently play a part in the management effectiveness.

Besides, the scores in management effectiveness may also reflect the nature of protected areas, especially the type of management authority. For example, although all of the protected areas scored poorly in finance, both WWK and HCC managed by the local governments had scores lower than TRM and DTK which were managed by forestry agencies. (As it is still not required to have a management plan for the Major Wild Habitat, toward which the Forestry Bureau applies only limited funding and human resources, we didn't include RRM on the list of comparison in this topic.) A similar situation can be observed in the category of "basic infrastructure," which normally requires more funding. All TRM, DTK and RRM managed by the Forestry Bureau scored higher than the standard of 0.67, whereas WWK and HCC both managed by the local governments failed to do so.

Analyzing the average score of each element, all five case studies performed relatively well in the "planning" element but relatively poorly in the "process" element. This shows a discrepancy between the goal setting and the actual actions taken. Within the "planning" element, the score was the highest for "management objective," whereas within the "process" element, the score was the lowest for "management plan." This may suggest that the objective lacks the support of a concrete and workable plan. In the "input" element, as the score was high for "basic infrastructure" and low for "staff" and "finance," this might hint that the Taiwan government pays attention to setting up facilities, equipment and route construction but ignores

capacity building of the protected areas. In sum, finance, human resources and management planning are three major deficiencies for the case studies. Based on these evaluation results, we suggest that strengthening management planning of protected areas should be given top priority among the follow-up actions, since it takes national policy to break through the constraints of budget and human resources.

Comments on Adjustments to RAPPAM

As mentioned above, RAPPAM is not designed specifically for site-level evaluation, so we made some adjustments in it to allow flexibility in the coordination of the actual evaluation situations, as well as to strengthen the effectiveness of the tools used in the evaluation of individual cases. Below, we review and discuss their effects from both perspectives of materials and information and more participation and inputs of stakeholders.

Materials and Information

The original format of RAPPAM is rather loose for the context of a target protected area (Ervin 2003a), hence our study's adjustment by amending and adopting the format of management plan provided several functions for the evaluation materials. Firstly, it reflected the status and dynamics of relevant environments and natural resources, as well as the existing management mechanism. The case studies proved that it could provide comprehensive information for broader and deeper discussions on the context of the target protected areas, which would overcome the limitation of insufficient data of RAPPAM (Leverington and others 2008; Quan and others 2009). Secondly, it simultaneously reviewed and supplemented the deficiencies of the formats and contents of the plan, which then could effectively respond to the weakness of management planning shown in the results of evaluation mentioned above. Together with the essential management measures responsive to the pressures and threats, RAPPAM made it possible to discuss specific enquiries of individual case as Ervin (2003a) suggested. Thirdly, the comprehensive information of the target protected area could be used to contribute to the transparency and accountability of evaluation, one of its fundamental functions, and data quality, which was a concern of Hockings and others (2006), Stoll-Kleemann (2010) and Cook and Hockings (2011).

More Participation and Inputs of Stakeholders

As to the make-up of the people involved in the evaluation, this research team emphasized the participation of the local communities. This is significantly different from most

RAPPAM cases in which the people involved in the evaluation were chiefly personnel from the management authorities and occasionally of some local non-profit organizations. This study added three occasions (steps) to allow stakeholders to voice their opinions and to be involved in more discussions. The anticipatory visiting and interviewing of stakeholders was introduced at the initial stage of the evaluation processes, which not only allowed collection of the comments of different stakeholders but was a good way to clarify and communicate the situation of the target protected area with the stakeholders, who often lacked channels to receive relevant, comprehensive, accurate information. Further, in the case of WWK, the anticipatory visiting and interviews helped in the preparation of evaluation materials and resolution of tensions and misunderstanding between local organizations, stakeholders and the management authority in order to make the evaluation workshop happen (Lu and Wang 2006).

The second occasion (step) was the open-discussion forum of the first workshop where participants were free to comment on the current context of the protected areas. The purpose of this activity was to generate diverse opinions among the stakeholders so as to prevent the evaluations from becoming restricted to the objectives and framework set forth by the government, or overly dependent on the expert-oriented approach as Bertzky and Stoll-Kleemann (2009), Stoll-Kleemann (2010), and Cook and Hockings (2011) mentioned. At this forum, comments were collected on the management authorities' capacity and positions, and different perspectives of pressures and threats, and several common grounds on essential management measures were identified for the case studies in this study. We suggest that it was also an occasion for stakeholders to be involved in policy-making of protected areas. For example, in the case of WWK and HCC, representatives of local communities amended the objectives of the protected areas and developed a three-year work plan with priorities and resources distribution in the forum of the first workshop. Although the results of this process differed among the five case studies, workshop participants of some cases proposed alternative objectives and visions during the workshop session, which became the basis of following evaluations, while others did not; the open-discussion format stimulated the willingness of stakeholders to discuss the feasibility of the management plan of the protected areas.

Lastly, the case studies showed that to interview stakeholders by evaluation questionnaire beforehand and to present the results as references could effectively speed up the processes of the second workshop. Also, it could enhance the quality of evaluation data for better understanding of participants on the questionnaire. Despite that, the implementation experiences showed that the questionnaire and discussion process were still very time

consuming and tedious. Hence, the effectiveness of having to complete the evaluation workshop within a few days should be further discussed. Further, the management authorities usually dominated the workshop because it didn't include specific on-site descriptions in the questionnaire which the stakeholders, particularly the representatives of local communities could understand easily.

Conclusion

Applying RAPPAM, this study evaluated five protected areas in Taiwan. It examined pollution as the most often mentioned pressure and threat in the case studies. Except for the remote areas, the major pressures and threats to the protected areas come from outside, so they are deeply influenced by the macro economic and social environments of Taiwan, which are difficult for the management authorities to deal with alone. This study also reveals that categories and extent of pressure and threat are related to remoteness and location.

In terms of the management effectiveness, the discrepancy between the goal setting and the actual actions shown from the analysis reflects the inadequacy of management planning. Considering the inadequacy already manifested in four out of five cases, this might be a common problem for protected areas in Taiwan. As both funding and human resources are also deficient, in consideration of the constraints of policy on budget and personnel, this study suggests that top priority should be given to management planning in order to guide efforts to improve the management effectiveness of protected areas in Taiwan. To sum up, this study has described the management pattern of protected areas in Taiwan and, on that basis, has identified deficiencies and identified action priorities for its five case studies.

This study made several adjustments to RAPPAM, including: amending and adopting the format of management plan as the evaluation material offered the benefits of building up links with management planning, facilitating anticipatory visits and interviews, allowed the inputs of stakeholders, particularly local communities, and hosting open-discussion forums, which allowed stakeholders to participate in decision-making. These adjustments effectively made it possible to gather and share comprehensive information, allow increased participation of stakeholders, and increase data quality, which can open the door to more responses to the enquiries concerning site evaluation. Naturally, there remain some other matters that need attention.

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