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談國家公園的經營規劃策略

The Strategic Plan for National Park Management

—— 十一世紀是全球生態保育的世紀，國家公園更需有符合時代要求的經營規劃策略。「規劃策略」為指導一個組織面對新挑戰與規劃未來的有效方法，策略中要明確訂定經營之「願景」、「任務」與「目標」，故為一個較長期（一般為10年）的經營規劃案。經營規劃策略中還要包括一個較短期（如5年）的「執行規劃案」。

過去經營方式的成敗，是下一步改善經營方式的重要依據，即所謂的依循「適應性經營」或「生態系經營」的經營理念。經營結果的指標必須量化，量化數據必須能用統計學判定其顯著性。在此概念下，量化的數據是得自科學的試驗。所有的執行規劃要包括數個步驟（如試驗、監測、紀錄、倉儲、分析、詮釋），最後是應用於政策之形成。例如新闢一條步道，從步道設置的目的、設計方法、可能造成地景衝擊的預估與步道之承載量，皆需有處理組與控制組作為比對，並就監測數據得出此步道造成的環境衝擊，以求得統計顯著性。此結論可得悉執行規劃案中事先環境評估的正確性與周延性，以及失誤與差距。

The 21st century is an era of global ecological conservation, and all national parks need a strategic plan for their management to meet the demand of the century. A strategic plan is the effective method for directing an organization to face new challenge and program for the future. The plan must contain specified vision, mission and well-defined goals, and so it is a longer (usually 10-year) term management plan that also includes a shorter (e.g. 5-year) operations plan.

The principles of the adaptive management or ecosystem management stress that the outcome of the past methods of management is an important referential basis for further improvement. The indicators of the outcome need to be quantified and tested for statistical significance. Based on these principles, the quantified data come from scientific experiments. All operations plan must comprise certain items and procedures (e.g. experimentation, monitoring, recording, archiving, analyzing, and interpretation), and in the end be applied to the establishment of a policy. As in the case of constructing a trail, all aspects from its purpose to the way of its design and implement, the assessment of potential impact on landscape and its carrying capacity must have treatment and controlled groups for comparison, also its impact on the environment must be obtained from the monitoring data to provide statistical significance of various treatments. From the results and conclusion we can better evaluate the correctness and comprehensiveness of the predicted environmental impact assessment as well as the deviation and difference.



綜合各種資訊，能預測國家公園內環境與生態變遷的趨勢，
也是擬訂經營策略的依據，更是研擬經營政策的基礎。

The synthesized data can be used to predict the trend of environment and ecological changes in the national parks in a larger spatial scale providing the basis for planning management strategy and the science-based information for making the management policy.

除了採用科學試驗的經營概念外，還得利用先進監測科技，俾能獲得時間與空間尺度上有較長與較廣的資訊。突破傳統監測方式的限制（如受限於白晝、好天氣、可抵達的地點、可騰出的時間），才能獲得更多經營所需的資訊（如得自夜晚、惡劣天候、偏遠地點、全年全日的資訊）。這些資訊非得靠更先進的儀器設備（如加裝自動紀錄器與設置無線偵測儀網路），始能突破時間、空間與設施的限制。

處理蒐集的資訊又是另一項大挑戰。傳統的資料存放方式（如放在個人資料庫內），有遺失與無法再利用之經驗，且難與他人有效共享，陷入資訊能趨疲的困境，嚴重縮短資訊的使用壽命與效果。因此，建立完善的「資訊管理系統」是更有效率使用資訊的基礎。資訊要經過品質管理程序，在統一規範文件下存放，達到資訊可長期倉儲，具有流用、共享、比較、整合與綜合分析的功能。

經營者所需之資訊，必須靠跨領域組成的研究團隊提供。唯有能綜合各種資訊，並在監測和網際網路的基礎設施下，始能較全貌的了解生態現象與過程，將此資訊轉換成可運用於經營的文件。而資訊之其中一項重要用途，是能預測國家公園內環境與生態變遷的趨勢，可以區分人類活動造成的衝擊與自然營力造成的擾動之結果，還是綜合兩者所造成的效應。這些知識是能改善經營的科學資訊，也是擬訂經營策略的依據，更是研擬經營政策的基礎。

唯有確實遵行經營規劃策略，依循「適應性經營」的規範，「科技監測系統」的採用與「資訊管理系統」的建置，才能更合理的經營國家公園，走向可永續使用資源之經營路徑。

In addition to the operation concept adopting scientific experiments, emerging monitoring technologies must also be used in order to obtain information that is longer in time and broader in space. We can obtain more data (at night, in foul weather, from remote places or 24 hours daily in a whole year) necessary for operation only by breaking the limit of traditional monitoring methods (e.g. collect data during daytime, in good weather, from readily accessible areas, with available time). These data rely on more advanced equipment (e.g. automatic recording devices and wireless monitoring networking, and other cyber-infrastructure) to go beyond the limit of time, space, facility, and labor.

Handling the collected data is another challenge. The traditional way of data storage (e.g. saved in a personal database) may suffer from data entropy because it is prone to getting lost or unable to be reused and difficult to be effectively shared by others, hence seriously cut down the data's life and values. Therefore, sound information management system is the basis of the efficient use of data. The data have to go through quality control and assurance and stored under standardized protocols to achieve enduring archiving with functions of flowing, sharing, comparison, integration, and synthesizing.

The information needed by the managers has to be provided by multidisciplinary research teams. It is only through integrating various data as well as the cyber-infrastructure of monitoring and internet that we can have a comprehensive understanding about the ecological phenomena and processes and then translate the data into documents readily applicable to management. One important usage of the data is to predict the trend of environment and ecological changes in the national parks, to decide if it is the impact caused by the disturbances due to human activities or natural forces, or by both. This knowledge is the scientific information to improve management, the basis for planning management strategy and the foundation of making the management policy.

It is only through executing the management strategic plan, following the code of adaptive management, adopting emerging monitoring technologies and information management system that we can manage the national parks in a more reasonable way toward the path to sustainable resources.