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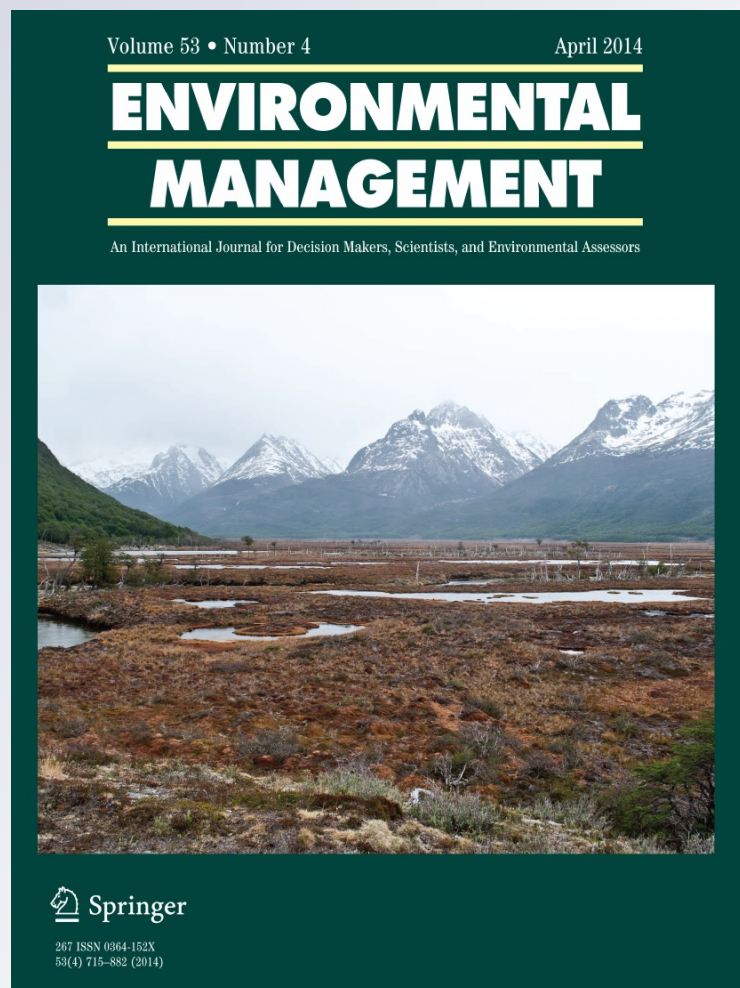
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Building Capacity for Protected Area Management in Lao PDR

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Abstract Declining biodiversity in protected areas in Laos is attributed to unsustainable exploitation of natural resources. At a basic level, an important need is to develop capacity in academic and professional training institutions to provide relevant training to conservation professionals. The paper (a) describes the capacity building approach undertaken to achieve this goal, (b) evaluates the effectiveness of the approach in building capacity for implementing conservation and (c) reviews implementation outcomes. Strong linkages between organizations implementing field conservation, professional training institutions, and relevant Government agencies are central to enhancing effectiveness of capacity building initiatives aimed at improving the practice of conservation. Protected area management technical capacity needs will need to

directly influence curriculum design to insure both relevance and effectiveness of training in improving protected area management. Sustainability of capacity building initiatives is largely dependent on the level of interest and commitment by host-country institutions within a supportive Government policy framework in addition to engagement of organizations implementing conservation.

Keywords Lao PDR · Capacity building · Biodiversity conservation · Protected area management

Introduction

Massive anthropogenic habitat conversion and overexploitation of commercially valuable wildlife are serious

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threats to Southeast Asia's declining biodiversity (Sodhi et al. 2004; Duckworth 2012). A coherent response to the biodiversity crisis in Southeast Asia will require a spectrum of bold actions involving complex social, economic, and political dimensions. However, at a very basic level, a response will require additional conservation professionals—from park guards to field biologists and laboratory technicians, to upper-level managers and policy directors (Mendez et al. 2007). Developing the knowledge and skills of individuals and organizations has been widely recognized as an important challenge to implementing conservation globally (Salafsky et al. 2002; Bonine et al. 2003; Rodriguez et al. 2005, 2006; Bawa 2006; Ceballos et al. 2009). Indeed, an acute lack of infrastructure, educational resources, and professional development opportunities for educators are viewed as critical obstacles to developing the capacity needed to effectively manage biodiversity (Ceballos et al. 2009).

Unique to Southeast Asia, the Lao People's Democratic Republic (hereafter referred to as Laos) has over 40 % forest cover and only 27 people per km² (ICEM 2003; World Bank 2014). The country contains four globally significant ecoregions and high levels of biodiversity (Alstrom et al. 2010; Duckworth et al. 1999; Schaller and Rabinowitz 1995; Schaller and Vrba 1996). The protected area system in Laos (described below) is acknowledged as well planned in terms of biogeographic design and still contains relatively more wildlife habitat than most of the neighboring countries. However, there are more than 300 species of wildlife within the system that are identified as species of conservation concern and are in decline (Duckworth et al. 1999; Robichaud et al. 2001; GoL 2003). A critical threat driving this decline is the illegal, commercial harvest of wildlife for domestic and international consumption (Nooren and Claridge 2001; World Bank 2005). A secondary, but increasingly significant threat to biodiversity in Laos is habitat degradation, which is driven by hydropower development, logging, and the conversion of natural forests to cash crops and plantations, and is proceeding at an unprecedented rate (GoL 2005). Increasing demand for natural resources for both economic development and for subsistence has placed enormous pressure on the country's protected area system (ICEM 2003; TRAFFIC 2008; Duckworth 2012). Addressing overexploitation and habitat degradation within the protected area system is undeniably a clear priority to conserving Lao's rich biodiversity requiring near-term actions such as law enforcement and conservation outreach to reduce these threats. However, a medium to longer-term approach involves building the capacity of academic and professional training institutions in Laos to provide relevant training for the relatively new cohort of conservation practitioners that are tasked with managing the nation's

protected areas. Protected area managers need to understand the threats facing their protected areas, the impacts of those threats on biodiversity values of the protected areas and the effectiveness of their management actions in mitigating those threats (Hockings 2003).

Increasing capacity to implement conservation action involves, (a) training of in-service conservation professionals (such as protected area managers) and, (b) strengthening university graduate and undergraduate programs that train future conservation and management professionals. There are a number of challenges associated with increasing capacity through these mechanisms: (i) For both types of training (in-service as well as undergraduate/graduate training), a fundamental obstacle in countries such as Laos is the lack of access to relevant educational and training resources. Among the difficulties facing universities with regard to training for conservation, particularly in the developing world are a lack of financial resources and educational infrastructure. Teaching materials, where available, are often outdated, in an inaccessible language, or exceedingly expensive given low levels of available financial resources. (ii) Further, training for protected area management needs to incorporate a spectrum of skills, knowledge and competencies. A comprehensive study identified two hundred and fifty different skills each with specific knowledge and competence levels that are needed at different levels and at different times by protected area staff in the ASEAN region (Appleton et al. 2003). (iii) Protected area management needs to be influenced by cutting-edge conservation science and vice versa: conservation science needs to respond to the needs of emergent issues in protected area management. However, while lack of access to relevant scientific literature is an acute problem in many protected area training institutions (Galindo-Leal 2001), there is a strong need for greater convergence between conservation science and protected area management (Terborgh 2004).

The Protected Area System in Laos

A Prime Minister's decree in 1993 established a national protected area system covering 13 % of the country (Berkmuller et al. 1995). According to the decree, the national protected areas (NPAs) have three objectives (Robichaud et al. 2001): (i) protection of forests, wildlife, and water, (ii) maintenance of natural abundance and environmental stability, and (iii) protection of natural beauty for leisure and research. Laos NPAs are classified as IUCN category VI—managed resource areas. They are zoned into areas of total protection, called “totally protected zones” and “corridors”, and areas called “controlled use zones” where activities such as agriculture, fishing, hydropower, commercial and subsistence non-timber forest

product (NTFP) harvest, and sometimes timber harvest are allowed (GoL 2007). A second important policy affecting protected area management in Laos consists of the 1996 Forestry Law that stipulates that (i) Management should benefit protected area residents; (ii) Management should proceed in a participatory manner with protected area residents; (iii) Management implementation should be delegated to local government (see Robichaud et al. 2001).

Since the inception of the protected area system, some 276 additional areas of locally significant conservation or watershed value have also been legally designated as conservation or protection forests at provincial and district levels (ICEM 2003). Protected areas in Laos have a critically important role to play in helping maintain healthy wildlife populations, as well as safeguarding the natural resources that form the basis of local livelihoods (Krahn and Johnson 2007). However, declining biodiversity in protected areas is attributed to unsustainable overexploitation of natural resources, including both wildlife and their habitats, thus weakening the resilience of the natural systems. There is much evidence to show that wildlife populations in Laos, as elsewhere in Southeast Asia, are in serious decline from over-harvesting for commercial trade and, to a lesser degree, for subsistence (Duckworth et al. 1999; Nooren and Claridge 2001; Sodhi et al. 2004; Johnson et al. 2006; TRAFFIC 2008; Duckworth 2012). Natural resource extraction is the foundation of the country's recent explosive economic growth. The annual GDP growth rate for Laos ranged from 7.5 to 8.5 % from 2007–2012 (World Bank 2014), based largely on increasing hydropower development and mining. In contrast to the strong economic growth in urban areas, 67 % of the population in Laos remains in rural areas and are largely dependent on swidden agriculture and natural resource consumption for subsistence. This has important implications for the conservation of biodiversity within the protected area system (Krahn and Johnson 2007).

Capacity Needs for Conservation and Protected Area Management

Rapid and ongoing advances in conservation science and tools that have significant repercussions for protected area planning and natural resource management can make a positive contribution to biodiversity conservation and protected area management in Laos. Yet, a critical gap exists between relevant knowledge and skills in conservation science and practitioners who can apply them effectively as is the case in Laos. Studies have shown that in a number of other countries, there are significant gaps in training for those who manage conservation landscapes, work in sectors (for example, forest departments) that directly affect these landscapes, or decide on policy (Ceballos et al. 2009).

Training in protected area management encompasses several themes that range from skills and knowledge in human resource management, field craft, natural resource assessment, conservation management of ecosystems, habitats, and species, sustainable development and communities, protected areas policy, enforcement, and awareness education (Appleton et al. 2003).

In Laos, as in many other countries, the challenge of producing well-trained professionals to implement conservation and establish sustainable practices in protected areas is enormous. Most young professionals employed in natural resource research and management agencies in Laos are trained by the science or forestry faculties at the National University of Laos (NUoL). Although the science curriculum traditionally focused on foundation studies (e.g., biology, chemistry) and laboratory skills, they now offer courses such as botany and ecology with biodiversity conservation taught as an elective to meet the demand for skills in natural resource research and management. The forestry curriculum has traditionally included more applied coursework such as forest policy and utilization, watershed and land use planning, and forest management that is being upgraded to address topics in protected area management. These faculties have a critical need for relevant materials in the Lao language for teaching biodiversity conservation principles that integrate local circumstances within a global context.

To address the need to strengthen protected area management in Laos through enhancing capacity to implement conservation, the network of conservation educators and practitioners (NCEP), an international capacity building initiative (<http://ncep.amnh.org>) and an international conservation NGO, the wildlife conservation society (WCS) have been working in collaboration with the NUoL since 2003 to improve both the capacity of faculty to teach topics in conservation biology and the capacity of protected area managers to apply conservation knowledge and skills to managing protected areas. The capacity building initiative focused on a subset of the themes related to skills and knowledge (Table 1) identified as essential components of protected area management (Appleton et al. 2003). The paper (a) describes the capacity building approach undertaken to achieve this goal, (b) evaluates the effectiveness of the approach in building capacity for implementing conservation, and (c) reviews management implications that could be more widely applicable in similar conditions.

Materials and Methods

The NCEP Project

The NCEP, a project led by the center for biodiversity and conservation of the American museum of natural history,

Table 1 Training modules developed and delivered during phase 1 (2003–2005) and Phase 2 (2007–2010) of the NCEP project in Lao PDR

Module	Phase 1	Competencies ^a
1	Interactive teaching methods	K, S
2	What is biodiversity?	K
3	Threats to biodiversity	K
4	The values of biodiversity	K
5	Habitat loss and fragmentation	K
6	Applied demography	K
7	Threat assessment in conservation planning and management	K, S
8	The global carbon cycle and climate change	K
9	Monitoring in an adaptive management context	K, S
Module	Phase 2	Competencies ^a
1	Introduction to national protected area (NPA) issues in Lao PDR	K
2	Protected area site planning	K, S
3	Managing protected areas for biodiversity: creating linkages and mapping land use	K, S
4	Building a conservation constituency: outreach strategies	K, S
5	Protecting biodiversity: enforcement strategies	K, S
6	Monitoring for management: an overview	K, S
7	Monitoring wildlife populations for management	K, S
8	Sustainable wildlife use in tropical forests	K, S

^a Types of competences that the module provides including, *S* skills to perform protected area tasks and, *K* knowledge to understand underlying principles of protected area management (see Appleton et al. 2003)

aims to improve training in conservation biology through innovative educational materials and methods that directly target teachers of conservation biology. NCEP is a global initiative, currently active in Bolivia, Laos, Madagascar, Mexico, Myanmar, Peru, Rwanda, the United States and Vietnam. It aims to create and make widely available a variety of resources to teach biodiversity conservation (<http://ncep.amnh.org>). A central goal of the project is to increase teachers' and trainers' access to high quality and free-of-cost teaching materials. To meet this goal, NCEP collaborates with partner institutions and individuals to develop a series of multi-component teaching resources called modules. These modules include a *synthesis* document that brings together key concepts, applications, and literature for a topic, an easily modified visual *presentation*, and a practical *exercise* for laboratory or field use. Exercise solutions and teaching notes are also provided for the instructor, as are learning goals and student assessment questions. Local adaptation is a crucial feature of NCEP, empowering in-country partners and making the materials immediately useful for faculty, students, and professionals who are already working in or associated with the field of biodiversity conservation.

Phase 1 of the project in Laos (2003–2005) involved the training of 14 faculty members at NUoL in nine modules in conservation biology adapted and translated to the Lao

context and language, through four training workshops (Table 1) (Hallam 2005).

Developing a Conceptual Framework

Based on the results from Phase 1, we developed a conceptual framework illustrating the assumptions of Phase 2 of the NCEP project in Laos (Fig. 2). The project's goal was to create the conditions necessary for enhanced training in conservation biology and protected area management at the National University of Laos. These conditions included making available necessary training materials in the Lao language, training faculty to use the training materials and providing relevant site-based implementation opportunities to apply knowledge and skills acquired during training workshops. The project, therefore, pursued two broad objectives: (i) to enhance institutional capacity of the Faculties of Forestry and Science at the NUoL to teach conservation biology and principles of protected area management and (ii) to increase conservation related knowledge and skills of protected area managers. To achieve these objectives, the project planned to implement four major activities, including (a) the development of appropriate training modules on protected area planning and management in the Lao language, (b) training the faculties of Science and Forestry at NUoL in the instruction of these modules, who

would in turn, (c) use the modules to train protected area managers and then, (d) provide technical support for managers to implement the learned planning and management tools in their respective protected areas. By making relevant teaching materials and sufficient support available, the project expected to see an increase in the knowledge and skills of faculty trainers at NUoL to teach topics in protected area management, followed by at least a 25 % increase in the knowledge and skills of staff in protected area planning and management in a proportion of the National and Provincial protected areas in the country by 2010 (Fig. 2). Ultimately, the project expected that the availability of training materials and trained faculty would pave the way for integration of the training materials into existing teaching curricula at NUoL and the creation of a new certificate/diploma/graduate course for protected area managers within the faculties of science and forestry at NUoL.

Implementation

The project was implemented in seven NPAs and six provincial protected areas (Fig. 1). The ongoing engagement of a national agency or an international NGO to support the government in PA management was used as a criterion in the selection of the protected areas. Following the conceptual framework for the project, four activities were implemented from 2007 to 2009 (Fig. 2).

Development of Modular Training Materials Adapted to the Lao Context

Over a period of 18 months, eight modules were developed (in addition to the nine developed in Phase 1) by collating all existing information on module topics published in the peer-reviewed and grey literature (Table 1). All components were first developed in English through extensive consultations with academicians and practitioners with experience in research and conservation in Laos. Following standard international scientific journal practices for peer review, each module was reviewed by two external reviewers who were scientists with knowledge of and/or with project implementation experience in Laos.

Training of NUoL Faculty, NPA and PPA Managers

Following module development in English, WCS staff worked with NUoL faculty to review the content of modules and coached faculty members in interactive techniques for teaching the modules and assisted with the translation of the modules to Lao language. WCS staff trained NUoL faculty in the use of the training modules by working closely with them in small group workshops that allowed for an intensive exchange of ideas and clarification of concepts. Following

this, the trained faculty used the modules to teach national and provincial protected area managers and other NUoL faculty in 2–3 day long training workshops incorporating one to two modules per workshop. Staff from the department of forest resources and conservation (DFRC), the national protected area office, participated in and contributed to the content of each workshop. This collaboration was aimed at strengthening the inter-institutional relationship between NUoL and DFRC as well as ensuring support from senior management in DFRC for the PA planning and management activities that were trained.

Training of NPA Managers to Implement Learned Planning and Management Techniques in Protected Areas

An important aspect of the project was aimed at providing an opportunity for protected area managers to apply and implement key concepts covered in the eight modules that were taught during training workshops. The assumption was that these concepts are best learned and more likely to be adopted through actual practice. Protected area managers who attended the training workshops were supported at field sites to (a) develop a conservation plan for their protected area (including the selection of conservation targets, threats, and interventions), (b) identify and map a 'total protection zone' (TPZ) in a protected area, and communicate the results to at least two villages on the boundary of the TPZ, (c) develop a wildlife protection strategy for their NPA or develop a handbook of NPA regulations for a protected area, and (d) develop a monitoring framework for their protected area (based on the conceptual model and wildlife protection strategy) that would allow managers to evaluate if the strategies selected were having the expected results of reducing threats and improving the status of conservation targets.

Evaluation

To measure the effectiveness of our NCEP strategy, we conducted (a) questionnaire surveys with participating faculty to determine relevance and utility of training materials (b) pre- and post-workshop assessments designed for every module aimed at evaluating the effectiveness of training by measuring the change in knowledge and (c) questionnaire surveys to evaluate workshop gains,

Use of Modules by the NUoL Faculty

Thirteen teachers involved in the development and evaluation of training materials were surveyed to assess the relevance of module content and their use with specific reference to the module components. Questions focused on determining how the training materials were being utilized by faculty in teaching existing courses.

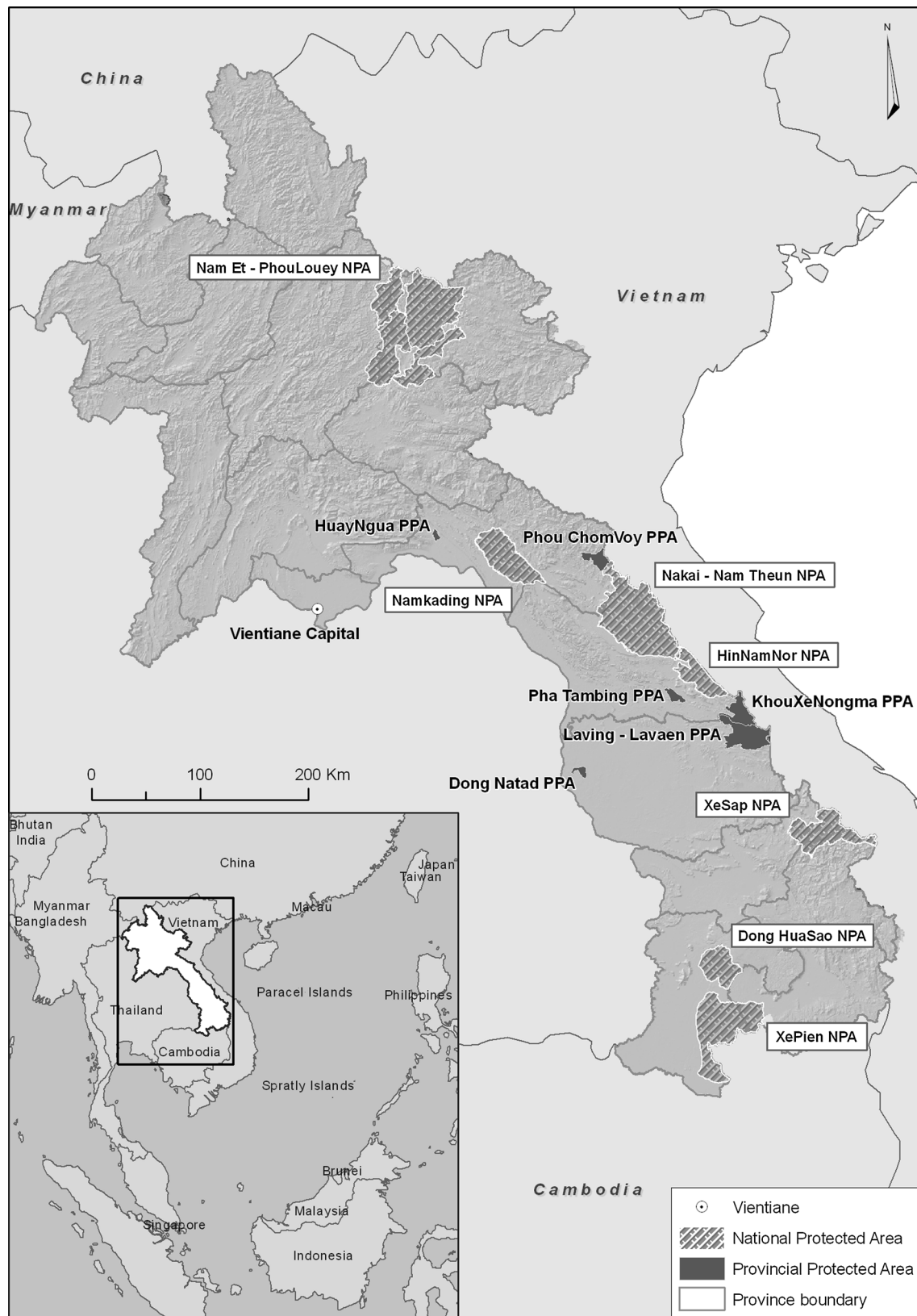


Fig. 1 Location of national and provincial protected areas that participated in the NCEP project in Laos

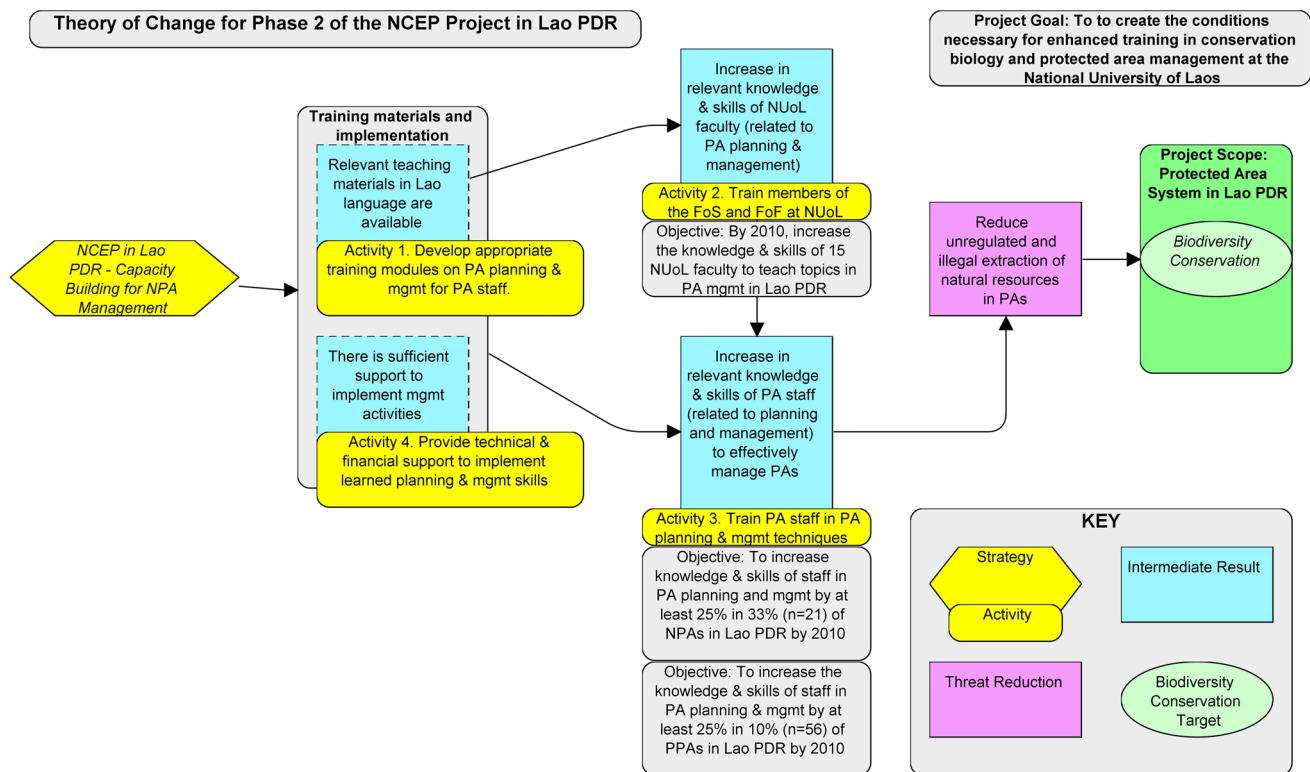


Fig. 2 Theory of change illustrating the assumptions and objectives for Phase 2 of the NCEP Project in Laos

Pre- and Post-Workshop Assessments

For every module, we developed a test that was administered to the workshop participants (including NUoL faculty, national and provincial protected area managers) prior to and following the training workshop. The aim of these tests was to examine the outcomes of the training by evaluating the extent to which key concepts in modules were understood by participants and to estimate the increase in knowledge following training workshops. The tests for two modules asked participants to rank their knowledge on specific issues related to topics on a scale of 1–3 (1 = little or no knowledge, 2 = some knowledge, but below level required for your role, and 3 = knowledge at required level for your role). For the remaining six modules, a variety of assessment categories were utilized (Hagenbuch et al. 2009). Specifically, multiple choice, true–false, match-ups of concepts with meanings, and short answer questions were used to test for recall of factual knowledge and to assess comprehension and application.

Questionnaire Surveys for Workshop Evaluations

Following training workshops, NUoL faculty trainers and trainees from national and provincial protected areas completed workshop evaluation forms. These forms were

designed to obtain participant feedback on workshop structure, module content and utility, and help characterize the value of workshops to participants.

Results

Summary of Evaluation Results

Utility of Training Materials Developed

All three components of the eight modules were used by faculty in teaching existing courses. Respondents generally agreed or strongly agreed that the *synthesis* component of each module was useful in facilitating preparation of lectures and provided a comprehensive background for lecturers and students. Faculty used the synthesis for preparation of lectures; personal topic review; and development of case studies. In addition, faculty most frequently used *presentations* for all of the following; to present and discuss topics, develop case studies and for discussion questions. *Exercises* were widely used by lecturers and perceived as the most useful of the three module components. 50 % of respondents strongly agreed that the exercises required students to think critically and 45 % agreed that the exercises helped apply concepts related to topics

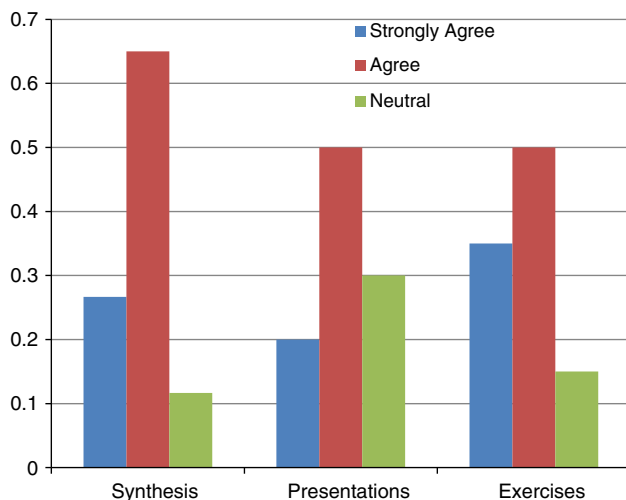


Fig. 3 Use of modules by faculty to teach existing courses in phase 1 of the project

taught during the lectures and supported interdisciplinary integrated learning (Fig. 3).

Effectiveness of Training for Knowledge Creation

For two modules, there was a (significant) positive change (post-workshop) in the number of participants who indicated (a) little or no knowledge in the topic (76 %), some knowledge but below level required for their role (11 %), and knowledge at required level for their role (98 %) (Chi Square = 113.03, $df = 2$, $p < 0.0001$, Fig. 4a). For the six remaining modules, the number of accurate responses increased by 34 and 38 %, respectively for National and Provincial protected areas and 25 % for NUoL faculty (Fig. 4b). For questions that could be evaluated for partially correct responses, there was an increase in the number of all correct responses (65 %), half-correct responses (239 %) and a decrease in the number of responses that were all wrong or not attempted (86 %) and those attempted with some element of correctness (44 %) (Fig. 4c).

Effectiveness of Training Workshops and Utility of Module Content

Workshop gains A set of three questions were designed to elicit feedback on the extent to which workshop participants felt that they had gained new knowledge, a deeper understanding of protected area management and the importance of effective biodiversity conservation in protected areas. Both NUoL faculty ($N = 29$ responses) and protected area managers ($N = 81$ responses) indicated positive gains for these questions (Fig. 5).

Module content and workshop structure 12 statements sought feedback on relevance of module content, module

structure, and effectiveness of instruction by trainers. A majority of protected area managers strongly agreed or agreed with all 12 statements. 12 responses did not agree that there was sufficient time for discussions, the highest number disagreeing across all the statements (Fig. 6).

Implementation of Learned Planning and Management Techniques

Three implementation activities were designed to provide opportunities for workshop trainees to put into practice concepts and skills acquired during training workshops. The NUoL/WCS training team traveled to the protected areas to guide protected area staff through the implementation activities. At the conclusion of the first training workshop, participants were asked to collaboratively develop management planning frameworks for their respective protected areas. The objective of the exercise was to identify conservation targets (key species), threats, and interventions for the protected area following principles presented in the module on site conservation planning (Rao et al. 2008). Six protected areas each developed three conceptual models following a four-day consultation with protected area staff, government officials, and villagers (Spence and Sypasong 2008). These were printed in the Lao language and made available to the relevant protected areas as a planning tool for management activities.

Following the second workshop, protected area staff participants were asked to draft a TPZ map, determine a method for communicating the TPZ to villages and develop a wildlife protection strategy following principles presented in modules on outreach, enforcement and hunting (Hansel et al. 2009; Lynam et al. 2009; Rao et al. 2009a). Of the 5 days, the first day was spent assisting participants to draft a TPZ on the topographic maps provided. 2 days were spent in discussions with protected area outreach staff on developing a method (with steps) and two activities to communicate these boundaries to villages in an outreach program. The final 2 days were spent working with protected area law enforcement staff to develop a wildlife protection strategy.

For the final implementation activity, managers from all participating protected areas, together with the WCS/NUoL team, spent 2 days developing monitoring frameworks to assess the status of their conservation targets and the effectiveness of their interventions to reduce key threats to these targets at their protected areas following principles introduced in modules related to monitoring (Rao et al. 2009b; Stokes et al. 2010).

Following the completion of the externally supported project, the Faculties of Science and Forestry at NUoL came together to host a certificate course in “Biodiversity Conservation and Protected Area Management” for

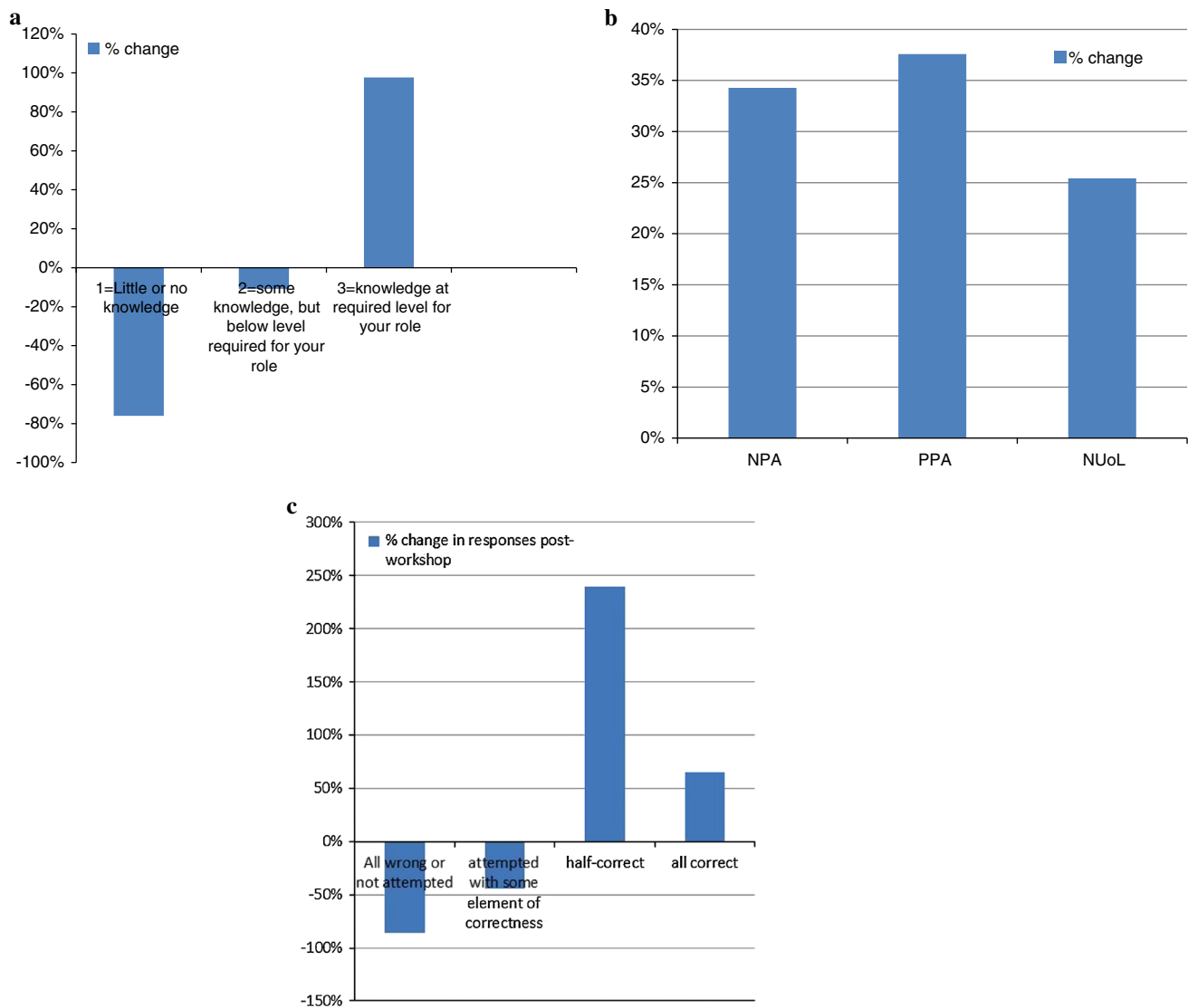


Fig. 4 **a** Percentage change in the number of participants who indicated (1) little or no knowledge in the topic (2) some knowledge but below level required for their role and (3) knowledge at required level for your role (N = 19 respondents), **b** Percentage change in accurate responses for six modules (N=16 National Protected Area

managers, 19 Provincial Protected Area managers and 14 National University of Laos faculty), **c** Percentage change in number of responses (post-workshop) to questions that could be evaluated for partially correct responses comparing post-workshop responses to pre-workshop responses (N = 47 respondents)

in-service professionals from protected areas, Government agencies such as the department of water and environment and conservation NGOs operating within Laos. This was the first time that a training course in conservation and protected area management was offered by the faculties to conservation professionals using the developed modules.

Discussion

A critical challenge to conserving threatened biodiversity in developing countries such as Laos is the lack of

appropriately trained conservation professionals to implement conservation activities (Bonine et al. 2003). Most frequently, approaches to address this capacity need have involved training students and faculty at overseas universities usually at high costs and with no guarantees that the trainees will return to build more capacity in countries of their origin (Bawa 2006). Furthermore, high costs imply that only few students or faculty are trained, often insufficient to make a significant difference to fill capacity needs even if they do return to their home countries. Most initiatives do not involve building local institutional or individual capacity and are designed with a heavy emphasis on external input

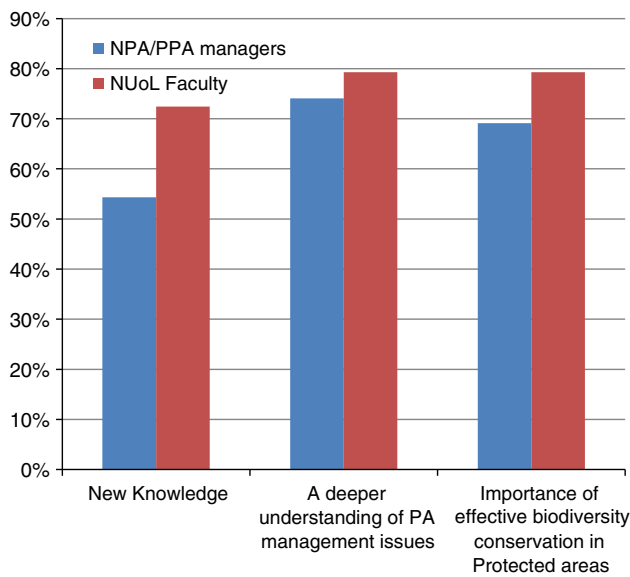
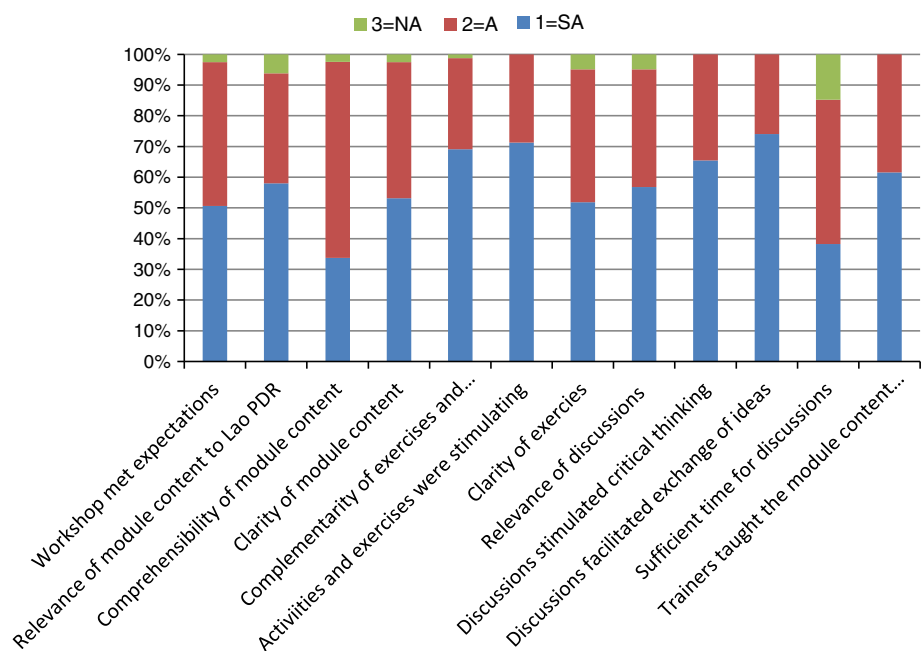


Fig. 5 Evaluation outcomes of training workshops from surveys of national and provincial protected area managers and NUoL faculty

(for example, external trainers), which tends not to continue following the cessation of project funding. In contrast, the approach described here was targeted at building “in house” local capacity of existing national institutions as a means of ensuring sustainability. The assumption is that the development of locally relevant training materials combined with the training of national university trainers should provide the basic building blocks necessary to develop full-fledged training programs to continue to generate the well-trained conservation professionals that are needed to manage the nation’s protected areas.

Two indications suggest that the capacity building approach was on track to support the project’s goal of creating the conditions necessary for enhanced training in conservation biology and protected area management at the National University of Laos. These indications are: (i) the utilization by faculty of the developed training materials in existing courses related to conservation and protected area management and (ii) the training courses for in-service protected area managers that were organized by trained faculty based on the developed modules and training materials. Ultimately, a specialization in biodiversity conservation or protected area management within undergraduate and graduate degree programs at NUoL could be useful in training future conservation professionals in the country. In neighboring Cambodia, recognizing the need for qualified managers, planners and researchers, the Royal University of Phnom Penh (RUPP) in collaboration with Fauna & Flora international (FFI) established a Master’s of Science Programme in Biodiversity Conservation (Sethik 2009). In comparison with the status of conservation training programs in developed countries such as the United States (Kainer et al. 2006) or Latin America (Mendez et al. 2007), local institutions in economically poor and biodiversity-rich, yet fast developing countries such as Laos have a substantial journey to make to achieve higher standards in training conservation professionals. However, prioritizing the need to build local professional capacity for conservation is an essential and critical first step alongside more direct, field-based interventions. In this context, international educational institutions with relevant expertise in curriculum and program development together with conservation organizations invested in

Fig. 6 Relevance of modules and effectiveness of instructions in training workshops for national and provincial protected area managers. Responses to 12 statements that sought feedback on relevance of module content, module structure and effectiveness of instruction by trainers by national protected area ($N = 14$) and provincial protected area ($N = 19$) managers. *NA* not agree, *A* agree, *SA* strongly Agree



applied biodiversity conservation have an extremely important role to play in helping build local capacity and strengthen local institutions in countries such as Laos (Bawa 2006; Rodriguez et al. 2006). Interdisciplinary graduate education and research programs are already in place in the Neotropics (Zarin et al. 2003) providing useful direction for the development of similar programs in Southeast Asian countries. The capacity building approach described here has certain unique characteristics: (a) the collaborative development of open-sourced, locally relevant training materials and the translation of these materials into the local language greatly enhances the accessibility of the materials, (b) the partnership between a professional training institution (NUoL), an implementing organization (NGO) and protected area agencies (the national division of forest resource conservation, the provincial protected area office and the district forestry office) provided the necessary linkages to enhance training effectiveness and field application. The approach has wider application in other biodiversity-rich, developing countries especially in Southeast Asia with similar prevailing conditions: intense threats such as overexploitation and habitat loss linked to declining biodiversity, low conservation management capacity within Government natural resource management agencies and gaps in conservation science education and training at academic and professional training institutions.

Measuring Effectiveness

Evaluating the effectiveness of capacity building approaches used to achieve conservation is recognized as an integral part of measuring conservation success (Kapos et al. 2008). Kapos et al. (2009) have further shown that assessing key outcomes is often more difficult than quantifying the degree of implementation of project activities (outputs) but that, while implementation is a poor predictor of success, assessing key outcomes is more relevant as they provide a more reliable proxy for conservation success. Key outcomes related to the stated objectives and that were measured in this project such as improved knowledge, understanding and skills indicated positive results. The modules were effective in increasing the faculty's knowledge of biodiversity conservation within the context of protected area management and the training workshops contributed to building capacity of faculty members to use the modules to teach topics relevant to protected area management (Hallam 2005). Given the novelty and complexity of some of the topics covered in training workshops, it is encouraging to see the increase in knowledge following training workshops. However, knowledge retention and application of learned principles will depend on individual competencies, available opportunities for

application and follow-up workshops to reinforce acquired knowledge and skills. In order to comprehensively evaluate the impacts of learning and the effectiveness of the capacity building approach, mechanisms will need to be designed to measure outcomes over varying time-scales. Further, using a counterfactual approach and comparing impacts with relevant groups not subject to the training could provide stronger evidence of the magnitude and scale of training effectiveness on the acquisition of skills and knowledge (Ferraro 2009, Margoluis et al. 2009).

Implications for Protected Area Management in Laos

The project's goal of creating the conditions necessary for enhanced training in conservation biology and protected area management at NUoL is ultimately directed at improving the practice of biodiversity conservation in the protected area system in Laos. Within this context, there are some important project implications for protected area management in Laos. The first implication is that close collaboration between the DFRC and NUoL on the development and implementation of training programs for in-service and future conservation professionals at various levels is imperative for the effective management of protected areas in Laos. In this project, the international conservation organization played a key role in bringing these two government institutions together and it is yet unclear, if there is sufficient momentum for these two institutions to jointly move forward without international support to address the capacity needs for conserving biodiversity in protected areas. The second implication is that beyond the need to enhance capacity of protected area managers, there is also a need for appropriate training programs to enhance capacity of upper-level managers and policy makers, especially within the provincial protected area offices recently mandated with protected area management. Well-trained protected area managers at multiple levels will be central to evaluate management effectiveness of protected areas (Hockings 2003). The third implication is that for training programs to ultimately increase the effectiveness of protected area management, it is essential for existing protected area management systems and processes in Laos to adapt by incorporating current best practices in natural resource management. Bi-directional feedback between protected area management capacity needs and curriculum design will be essential to insure both relevance and effectiveness of training in improving protected area management. Ultimately, a clear Government policy mandate to improve protected area management should translate to a need for well-trained conservation professionals. The final implication is that strong linkages between organizations implementing on the ground conservation action (local and international non-government

organizations) and academic/professional training institutions in biodiversity-rich developing countries are essential to provide field training opportunities in applied conservation research and management. Frequently, such linkages may be the only means for staff of natural resource management agencies to gain valuable field experience in project design and management to complement theoretical knowledge and skills. Nonetheless, while building capacity to implement conservation is essential, it is not sufficient to directly reduce threats to protected areas in Laos. There are political and economic forces at play in each protected area that must also be addressed to ultimately influence the effectiveness of conservation action (for example, see Hallam and Hedemark 2012; Johnson 2012). However, building capacity for protected area management should be viewed as an essential first step and a critical component of a comprehensive strategy that involves a diverse set of interventions.

Conclusions

The need for adequately trained conservation professionals is a key priority to effectively address declining trends in biodiversity, especially in tropical, developing countries. Building human technical capacity can consume resources, potentially diverting limited resources away from other, more immediate conservation problems that involve direct actions at the site-level to reduce threats (for example, enforcement). Yet, investment in capacity building is essential to a longer-term vision of supporting rapidly developing countries to become responsible stewards of their natural resources. Moreover, justifying investment in capacity building activities is often challenged by the difficulties involved in measuring success in keeping with short-term, donor driven deadlines. Designing appropriate evaluation mechanisms at varying time-scales is important to accurately evaluate learning outcomes and effectiveness of capacity building approaches (Margoluis et al. 2009). Project results indicate that activities were “on track” to fulfilling objectives and achieving the goal of enhancing capacity for protected area planning and management. Strong linkages between international NGOs and academic/professional institutions in countries such as Laos can make a significant difference to capacity building initiatives by facilitating the application of conservation principles and tools in real-world, field-based situations. Most importantly, sustainability of such an initiative will ultimately be largely dependent on the level of interest and commitment by host-country institutions in addition to support from international conservation NGOs and the donor community.

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