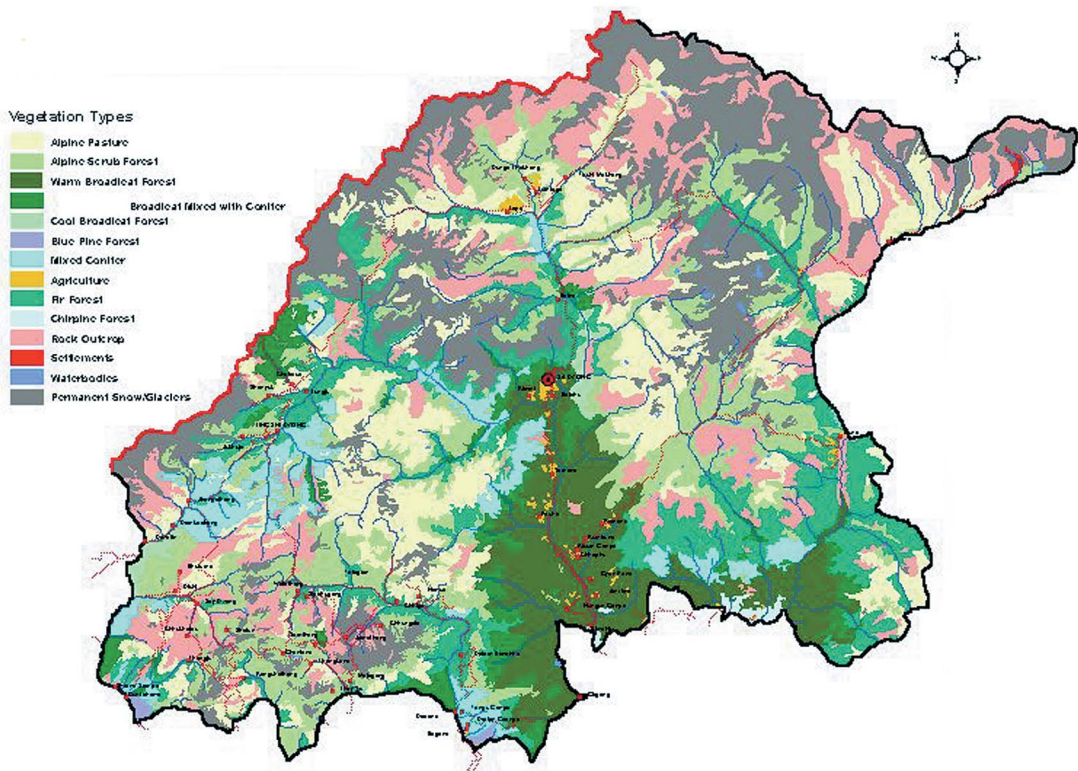




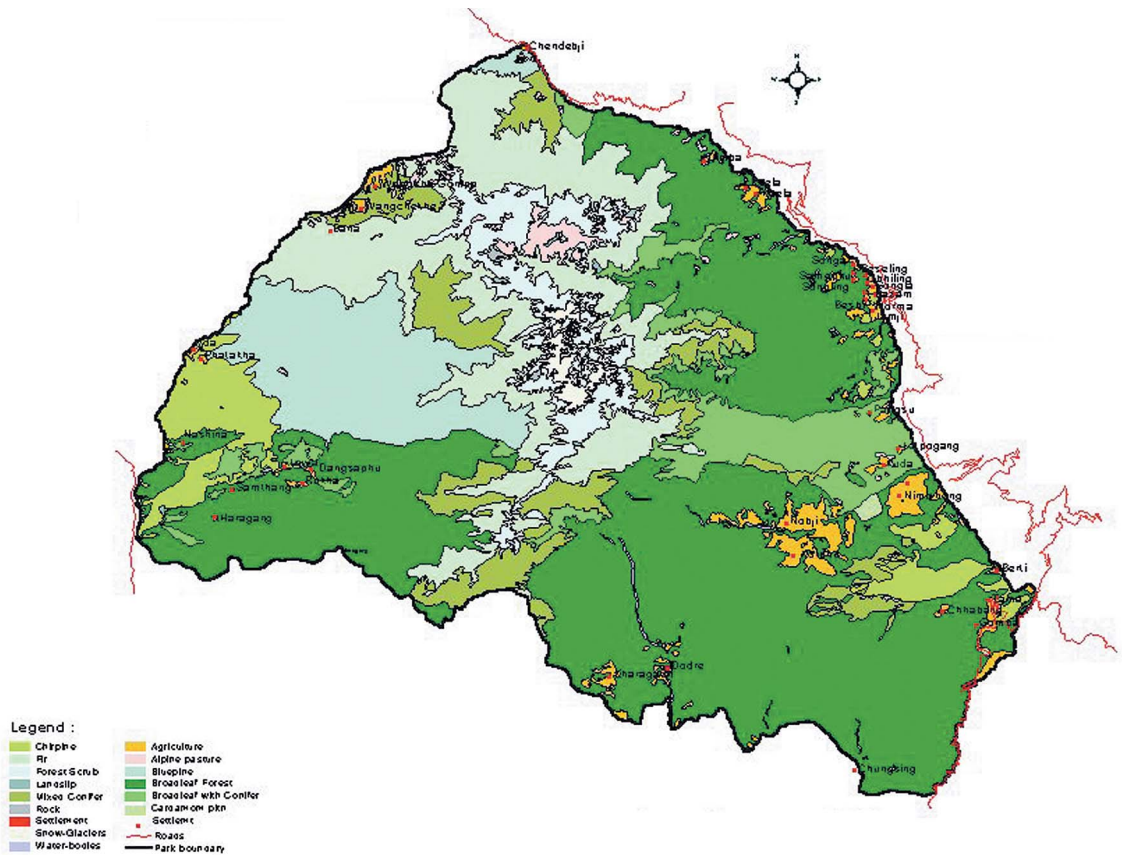
Bhutan

Bhutan
Management Effectiveness Assessment
of Four Protected Areas
using WWF's RAPPAM Methodology

Jigme Dorji National Park



Jigme Singye Wangchuk National Park



Tshering, K.
 2003
 Bhutan: Management Effectiveness Assessment of Four Protected Areas using WWF's RAPPAM Methodology
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 Gland, Switzerland

Front cover photograph: temperate forest, Wangdi Province, Bhutan
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BHUTAN

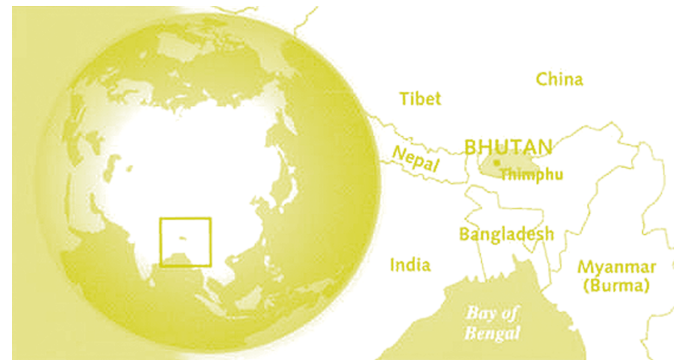
**Management Effectiveness Assessment
of Four Protected Areas using
WWF's RAPPAM Methodology**

K. Tshering

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INTRODUCTION AND BACKGROUND



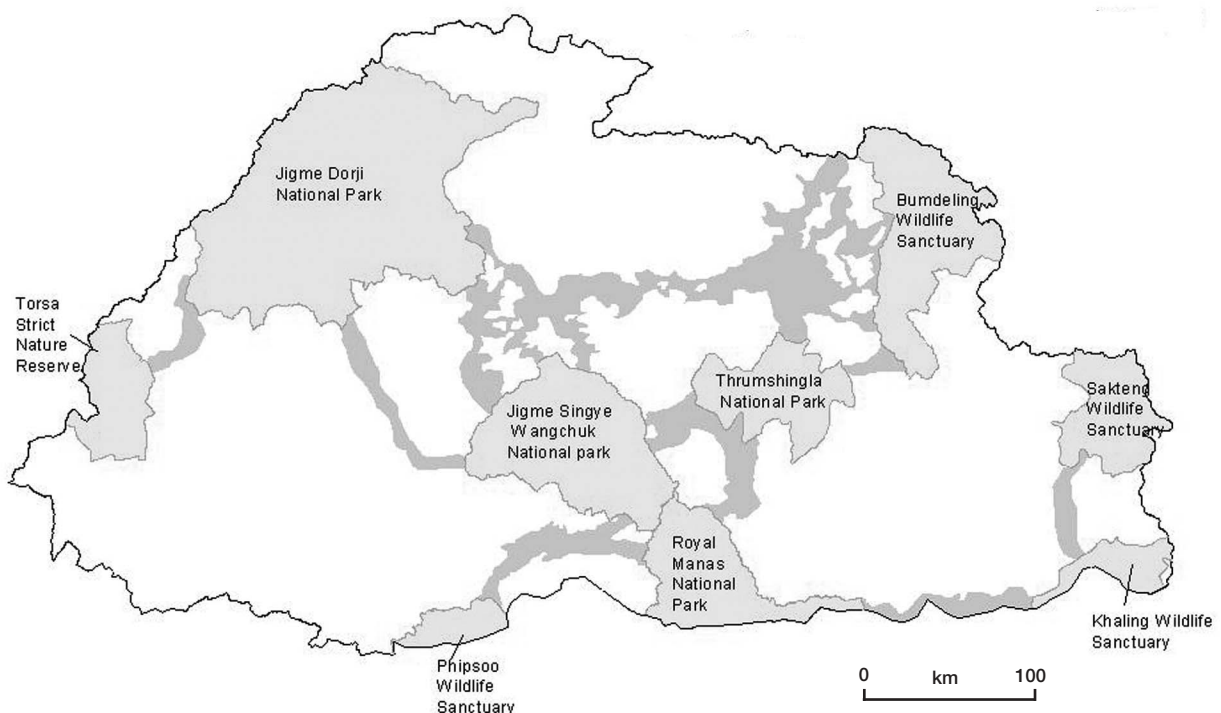
Bhutan, a country little known to the outside world, is situated in the eastern Himalayas, sandwiched between India and China. The country has an area of 40,076 square kilometres and a population of 698,950. While most countries have indiscriminately exploited their natural resources, Bhutan emerges as a model for conservation. The country has extensive forests – more than 72 per cent of the land is covered in different forest types, most of which are largely intact. These forest areas range in altitude from 150 metres in the south to over 7,500 metres in the north. A vast diversity of flora and fauna is found within these forests, which falls within a region considered by many conservationists to be a “global biodiversity hotspot”. It is estimated that there are more than 5,500 vascular plant species,

165 mammals, and 770 bird species, with a high degree of endemism found throughout.

The Royal Government of Bhutan places great emphasis on conserving the country’s biological resources. Around 26 per cent of the country has been set aside under the protected areas (PA) system. Recently, an additional 9 per cent has been designated as biological corridors, to allow unrestricted movement of various species between the protected areas, thus assuring their viability.

The protected areas system in Bhutan was revised in 1993 to ensure representation of the different ecosystems of the country; it currently comprises four national parks, four wildlife sanctuaries, and one strict nature reserve.

Protected Areas and Biological Corridors



Bhutan is a developing country, with more than 79 per cent of the population dependent on subsistence farming. Alongside its commitment to nature conservation, the government must also enhance socio-economic development. Concerned that development activities could take undue precedence over conservation in the future, the government has pledged to maintain a minimum forest cover of 60 per cent. Government development policies are constructed with the principle of integrating conservation and development: while the country pursues economic development, it will continue to ensure that conservation issues are adequately addressed.

Though balancing conservation and development can be a difficult task, Bhutan has accepted the challenge and is following a “middle path”, aimed at achieving sustainable development. This challenge is especially pressing and evident in the protected area system where local people live in all of the protected areas. Their presence is viewed as an integral part of ecosystem management in these locations.

The Nature Conservation Division (NCD), under the Department of Forestry Services, is responsible for managing protected areas. Currently, five protected areas have operational budgets, staff, and management plans. These are Royal Manas

National Park (RMNP), Jigme Dorji National Park (JDNP), Jigme Singye Wangchuk National Park (JSWNP), Thrumshingla National Park (TNP), and Bumdeling Wildlife Sanctuary (BWS). Four smaller areas are expected to become operational in the coming years.

The management of Bhutan’s protected areas is still at an early stage, enabling experience and good practice to inform the approach that is developed and adopted to meet the conservation needs of the country. The presence of local residents within protected areas makes the conservation task complex and challenging, requiring the NCD to take prudent steps in addressing conservation issues. Even though it has only recently embarked on protected area management, the NCD recognizes the need to assess park management practices in order to make pragmatic decisions regarding future management. As an initial step, the NCD decided to conduct a self-assessment of the operational protected areas of the country in order to:

- ◆ review the overall progress of the protected areas, to identify strengths, weaknesses, opportunities, and threats
- ◆ help identify any technical support needed
- ◆ inform strategic biodiversity planning processes for the NCD.

IMPLEMENTING THE METHODOLOGY

The self-evaluation exercise to assess the management effectiveness of the protected area system was conducted for four of the five operational protected areas: JDNP, JSWNP, BWS, and TNP. The RMNP was excluded because of political tensions along the Indian border. A map of each of the protected areas included in the assessment can be found on the inside front and back cover of this publication.

The assessment was conducted in two phases. The first phase consisted of a series of three, in-depth participatory workshops held at protected area (PA) sites, during the second half of 2001. Each workshop lasted a day and a half, and included presentations, small group discussions, and plenary sessions. This phase, which used questions based on the *WCPA Framework for Assessing Management Effectiveness* (Hockings *et*

al. 2000), provided a snapshot of the strengths, weaknesses, opportunities, and threats facing each protected area, and gave a broad overview of key issues. The second, supplementary, phase consisted of a series of focused interviews with park managers, staff, and stakeholders in April 2002. It was conducted with technical assistance from Jamison Ervin, a consultant fielded through the WWF/World Bank Alliance. This phase used the WWF Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) methodology, and provided a more detailed understanding of the issues raised in the first phase of the assessment. In-depth interviews with park managers provided detailed, qualitative notes on each of the questions in the Rapid Assessment Questionnaire (part of the RAPPAM Methodology). A final report combined the findings of both phases.



Road at high elevation

Photo: © WWF/J.Ervin

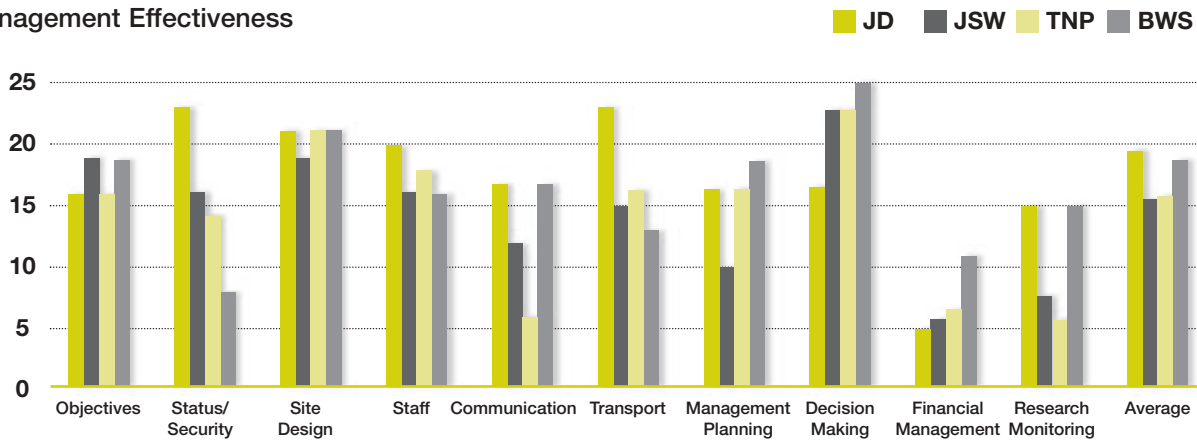
FINDINGS AND ANALYSES

The main findings of the assessment are presented here, including management effectiveness, the threats and pressures faced, and the opportunities and weaknesses identified.

This section covers the findings of questions 6–16 of the Rapid Assessment Questionnaire. It looks at

the planning, inputs, processes and outputs/outcomes of the protected areas. Below is a graph illustrating the overall management effectiveness of each of the four parks included in the assessment. With a few exceptions (e.g. legal status and security, and communication), there is very little variation from park to park in management effectiveness.

Management Effectiveness



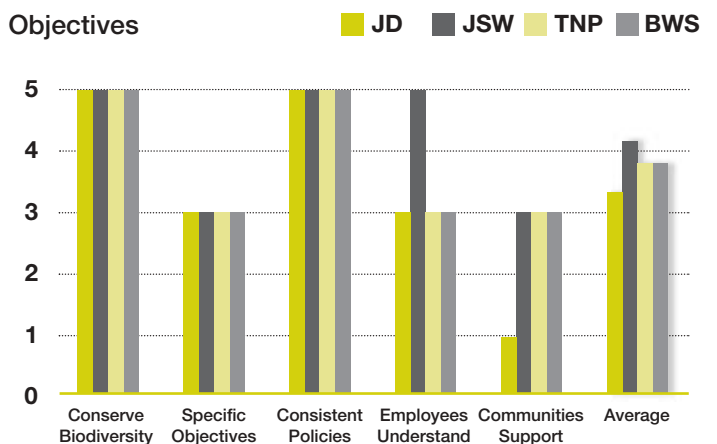
The detailed results from each set of questions follow, in graph form and explanatory notes. Responses were scored as follows: “yes” = 5; “mostly yes” = 3; “mostly no” = 1; and “no” = 0.

A score of 5 does not necessarily mean that there are no problems, nor does a score of 0 imply complete failure. Rather, the scores indicate general strengths and weaknesses.

PLANNING

OBJECTIVES

This section highlights the objectives, legal status/security, and the site design and planning of the four protected areas. It indicates the level of planning that is in existence.



a) *The PA objectives provide for the protection and maintenance of biological diversity.*

All four protected areas have clear objectives for protecting and maintaining biological diversity.

b) *Specific biodiversity-related objectives are clearly stated in the management plan.*

While each of the protected areas have broad objectives that focus on the conservation of biodiversity, management plans have more specific objectives for conserving biodiversity assets within the parks. Only a few key species are identified (e.g. tiger, takin, red panda, snow leopard), rather than a full range of species, and objectives are limited to vague statements, such as “maintain populations of key species” and “to protect populations.”

c) *Management policies and plans are consistent with the PA objectives.*

Protected area managers identified this as a clear strength of the protected area system; policies and plans are generally consistent with PA objectives.

d) *PA employees and administrators understand the PA objectives and policies.*

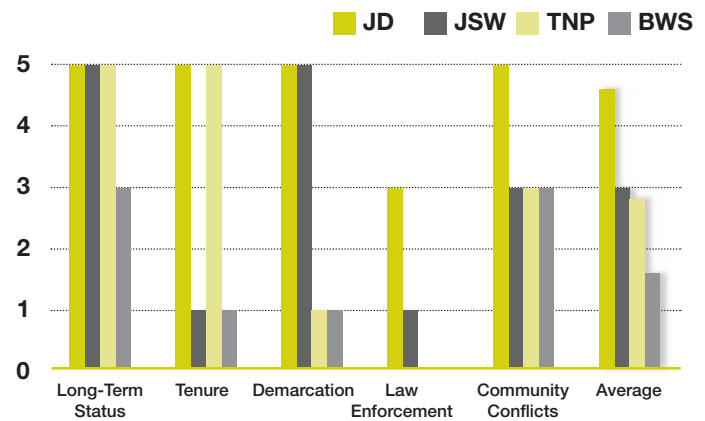
Park managers and the staff quite clearly understand the PA objectives.

e) *Local communities support the overall objectives of the PA.*

None of the park managers felt they could affirm this unequivocally. Two mentioned the initial resentment that many communities felt when the parks were first established. All mentioned that local communities often had high (and unrealistic) expectations regarding the park as a source of income, and did not clearly understand why the park had been established. One park manager highlighted problems with park zoning as a specific issue. However, park managers also felt that perceptions were gradually changing, partly as a result of the environmental education activities conducted by the parks in collaboration with the Royal Society for the Protection of Nature (RSPN). The prevailing attitude toward local communities was expressed by one warden, who remarked “We haven’t had enough time to convince them about why the park is here yet.”

LEGAL SECURITY

Legal Status and Security



a) *The PA has long term, legally binding protection.*

Three park managers felt that the parks were fully secure. One expressed some hesitation, noting that park boundaries were at times subject to negotiation.

b) *There are no unsettled disputes regarding land tenure or use rights.*

Although there were some disputes regarding tenure and land use in two parks, they were considered minor. However, once the zoning is complete there will be certain non-negotiable prescriptions applied which may create some disputes initially.

c) *Boundary demarcation is adequate to meet the PA objectives.*

Park managers felt that boundary demarcation is adequate, although they all agree that the demarcation of zones was unclear, including the core zone and buffer zone.

The protected area design is not considered adequate in any of the parks at the moment, particularly as zoning is not yet fully operational. There are important differences in the design among the parks, regarding core, multiple use, and buffer zones. At one end of the spectrum, JDNP has people living throughout the park; and clearly defined boundaries for various zones is not very relevant to management planning. At the other end, TNP has only a few settlements inside the park boundaries, but a large number of villages in the buffer zone. In the boundary feasibility study villages were excluded from the

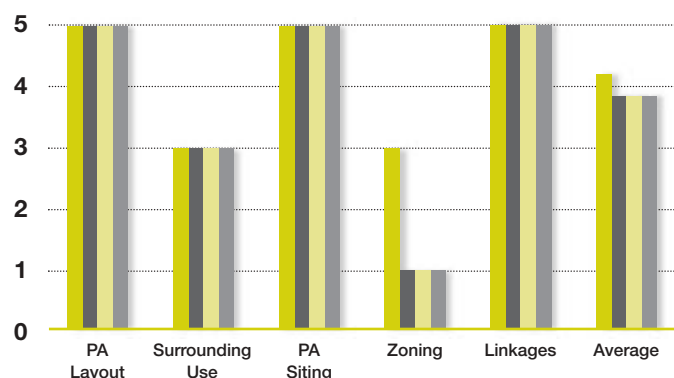
park area wherever possible and included in the buffer zone. BWS, on the other hand, has defined its buffer as containing no villages and has two geogs (local district authorities) in a multiple-use zone. The core zone has been roughly demarcated but the present use has not yet been phased out. The JSWNP has an intermediate position with population concentrations both in the future buffer and multiple use zones.

- d) *Staff and financial resources are adequate to conduct critical law enforcement activities.*
All four park managers identified problems with law enforcement, including illegal timber harvesting, grazing, poaching, and non-timber forest products (NTFP) collection. The main cause of inadequate law enforcement was an inadequate number of field-level staff. The JDNP faces severe problems with law enforcement, with poachers coming over the border from Tibet. Despite the overall score in law enforcement, there have been significant efforts in this area. For example, TNP has conducted a workshop specifically to develop an anti-poaching strategy for the park.
- e) *Conflicts with the local community are resolved fairly and effectively.*
There are presently no severe problems between the local communities and the park management. However, problems such as crop destruction and livestock depredation by wildlife has the potential to cause conflicts between the park authorities and local people.

SITE DESIGN AND PLANNING

PA Site Design

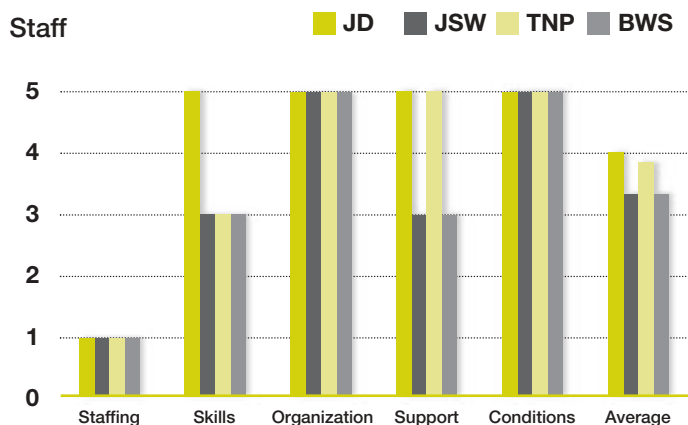
■ JD ■ JSW ■ TNP ■ BWS



- a) *The layout and configuration of the PA optimizes the conservation of biodiversity.*
The layout and configuration of the protected areas is one of the unqualified strengths of the entire protected area system. The areas were designed to optimize biodiversity conservation; two parks have recently adjusted their boundaries in order to better protect the habitat of key species such as the tiger.
- b) *The land use in the surrounding area (buffer, corridor) enables effective PA management.*
All four protected areas include a buffer zone, averaging from 3 to 5 kilometres around the park's core zone. All are connected via biological corridors to another protected area. However, the biological corridors do not yet have management plans, and therefore the degree of protection they offer is unknown. Presently, preliminary surveys are taking place in the biological corridors. Problems still exist regarding a clearly defined buffer zone and the legal status of the biological corridors.
- c) *The siting of the PA is consistent with the PA objectives.*
Siting is another of the unqualified strengths of the protected area system. The siting of new protected areas was based on preliminary wildlife surveys (particularly tiger surveys), as well as existing land use patterns. Together, the protected area system captures a good cross-section of the country's broad range of ecosystem types.
- d) *The PA zoning system is adequate to achieve the protected area objectives.*
All park managers expressed concern with the current zoning system. Zones were demarcated largely on paper and not on the ground. Zoning was also a major source of community tension, particularly over grazing rights. One park manager mentioned the need for better community involvement in determining the location of the zones.
- e) *The PA is linked to another area of conserved or protected land.*
Connectivity between protected areas is another obvious strength of the protected area system. All are connected via biological corridors, and JSWNP is directly adjacent to the RMNP. The question of resolving legal status of the biological corridors, however, still exists.

INPUTS

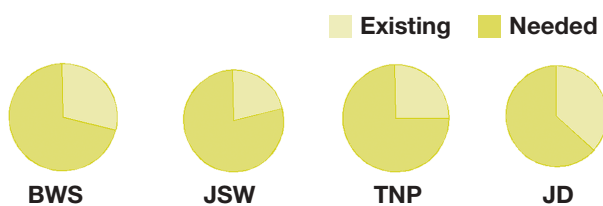
STAFF



a) *The level of staffing is sufficient to effectively manage the area.*

Inadequate staffing is one of the few weaknesses of the protected area system. All of the park managers identified an acute shortage of staff, particularly park guards. There was between 60 and 80 per cent fewer actual staff than the number approved. The impact of low staffing was widespread, with park managers citing ineffective law enforcement; poor threat detection, mitigation, monitoring and prevention; high workloads; low staff morale; poor staff planning; inadequate research and education; and a chronic crisis management mode at all levels, from NCD to park guards.

Actual versus Needed Staffing Requirements



The reasons given for low staffing are multiple. With a relatively low population, Bhutan faces a widespread shortage of human resources in all sectors. This shortage is compounded by the low number of trainees being produced annually by the Natural Resources Training Institute (NRTI), and, more acutely, from the Bhutan Forestry Institute (BFI). NRTI produces only 25 graduates per year; and BFI only 35. Park managers are not only limited to hiring from this small pool, they must also compete with the

Ministry of Agriculture and other agencies for these graduates.

Another area of concern is the high dependence on external consultants, particularly for biodiversity inventory skills, without the adequate transfer of skills to local staff.

Another reason for the shortage of staff is attributed to the government's policy of strictly limiting the number of governmental employees.

b) *Staff members have adequate skills to conduct critical management activities.*

While, generally, park staff members have adequate skills, the identification, surveying, and monitoring of biodiversity remains a critical gap. Park managers identified a range of simple but crucial skills, such as plant and animal identification, geographic information system (GIS) mapping, and simple surveying skills that would greatly improve their ability to develop natural resource inventories. One park manager also identified community relations and conflict resolution as an area for skills improvement.

c) *There is clear internal organization (e.g. job descriptions).*

All park managers felt that there was clear internal organization, and that all staff understood their responsibilities.

d) *Staff support (e.g. training, supervision, monitoring) is appropriate to the needs of the staff.*

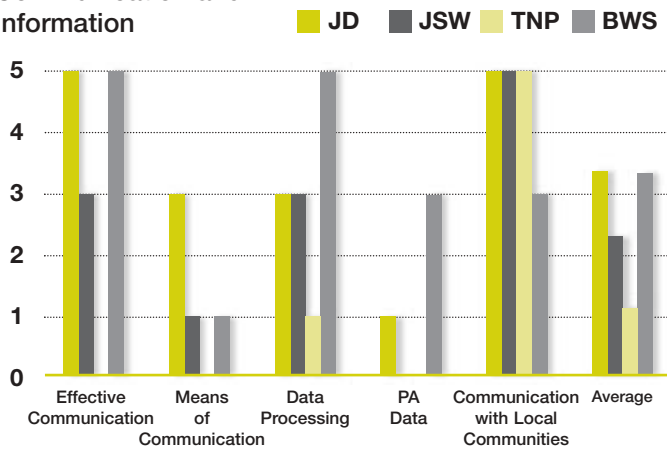
Although park managers felt that training was an overall strength, there were some concerns about the *ad hoc* nature of training opportunities, and reservations about whether or not training sessions were effective in providing key skills.

e) *Staff employment conditions (e.g. salaries, benefits, working environment) are sufficient to retain staff.*

Park managers considered staff conditions adequate, especially when compared with other agencies. Employees generally view the high degree of training opportunities as a major benefit, and salaries are consistent with or above local norms. Despite the lack of human resources throughout the country, jobs are very scarce, and several employees expressed relief in having a secure, well paid job.

COMMUNICATION AND INFORMATION

Communication and Information



a) *There is effective communication between all protected area staff and administration.*

Two managers felt that communication between staff was adequate, particularly since they had established monthly meetings with all park staff. One manager felt that communication could be improved, especially between his office and NCD headquarters. One manager felt that communication was entirely inadequate, primarily because of a lack of communication infrastructure.

b) *Means of communication between field and office staff are adequate (e.g. radios, telephones).*

The lack of adequate communication means is a clear problem in all protected areas. Even though there may be a telephone at a local warden's office, this may not be enough to ensure adequate communication. One warden explains, "My telephone is solar powered, and it doesn't always work. If I had more battery capacity, I could have telephone access full time." Another warden adds, "Communication is okay with park headquarters, and we communicate frequently, but it is almost impossible to reach guards in the field. I just don't have the equipment I need." One result of inadequate communication is that wardens and guards are often unable to catch poachers. Explains one warden, "Last year, I suspected that there were poachers in one area of the park, but I was unable to call for back up support. It is dangerous for one or two unarmed guards to try and go in and catch a gang of armed poachers."

Park staff identified the following specific communication requirements: high-powered wireless radios, handsets, walkie-talkies, and better solar capacity for telephones.

c) *There are adequate data processing systems (e.g. computers, software, filing systems).*

On average, park managers felt that data processing systems were adequate, given the amount of data they were handling, and their information needs, although several mentioned that their wardens did not have the equipment they needed. Three of the park managers had sophisticated computers, fax machines, printers, e-mail and web access, and other equipment. One (TNP) was noticeably weaker (the office computer was in storage until electricity was more reliable and accessible in the region). One park manager specifically identified the need for GIS software, in order to better track existing data and to create meaningful maps of the park.

d) *PA data are available and relatively recent (e.g. satellite imagery, aerial photos, field studies).*

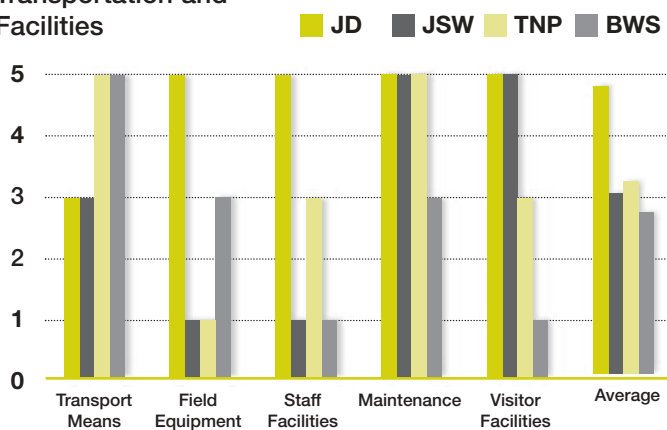
Lack of data is another major systemic shortcoming for all protected areas. Lack of detailed maps (i.e. 1:50,000), and/or satellite images, meant that guards were often unaware of the exact locations for specified management activities, and spent considerable time trying to locate sites on the ground. Remarked one warden, "We just go out there, following this path or that path, and hope it leads to where we are supposed to go." More fundamentally, managers lack detailed data about the biodiversity within their parks. While some data did exist (primarily community-based data in the form of oral reports of wildlife sightings and tiger survey data), the parks lacked detailed data about the actual presence or absence of species and populations; the extent and quality of critical habitat; the location of rare, threatened or endangered plant species; and species interactions. Moreover, any existing data tended to focus almost exclusively on the handful of charismatic megafauna (tiger, takin, red panda, and black-necked crane). While the national list of critically rare species includes several dozen species, data about these species are almost completely absent.

e) *There is effective communication with local communities regarding protected area management.*

Park managers saw communication with local communities as one of their strengths. In the process of developing Integrated Conservation and Development Programme (ICDP) plans, each park had held extensive participatory meetings and workshops with local community members.

TRANSPORT AND FACILITIES

Transportation and Facilities



a) *Transportation infrastructure is adequate to perform critical management activities.*

On average, park managers felt that transportation means were adequate, given that the vast majority of patrolling had to be done on foot because of the rugged terrain. Vehicles were adequate for transportation between the capital and the parks.

b) *Equipment for field-level data collection is adequate (e.g. field gear, GPS monitors).*

Several park managers and staff mentioned the need for global positioning system (GPS) monitors, as well as GIS software to analyse data. They also felt that while their headquarters may be fairly well equipped, their warden posts were not, and even less so for the park guards. Remarkably one warden, “What I’d really like is a field guide for identifying birds. I’ve begun my own study on the relation between birds and conifer species, but I’m not really sure of my ability to identify birds.”

c) *Staff facilities are adequate (e.g. staff offices, research stations, field offices) to perform critical management activities.*

Facilities varied from park to park, with the oldest park, JDNP, having relatively better facilities. However, most of the parks are in the process of completing building developments such as a park office complex, visitor centres, and warden and guard posts. So, in due course, the facilities of the parks will improve.

d) *Maintenance and care of equipment is adequate to ensure long-term use.*

Maintenance of equipment is a clear strength of the protected area system. Managers receive a regular budget for maintenance costs, and most feel this budget is sufficient to ensure long-term use, especially of vehicles.

e) *Visitor facilities (e.g. trails, signs, camping areas, visitor centres) are appropriate to the level of visitor use.*

All four park managers qualified their generally positive responses by stating that the visitor facilities were adequate but only for existing levels of use. In one case, there were no visitor facilities, but there were, however, very few visitors. Given the strong likelihood of tourism increasing in the future, this may be an area for future assessment.



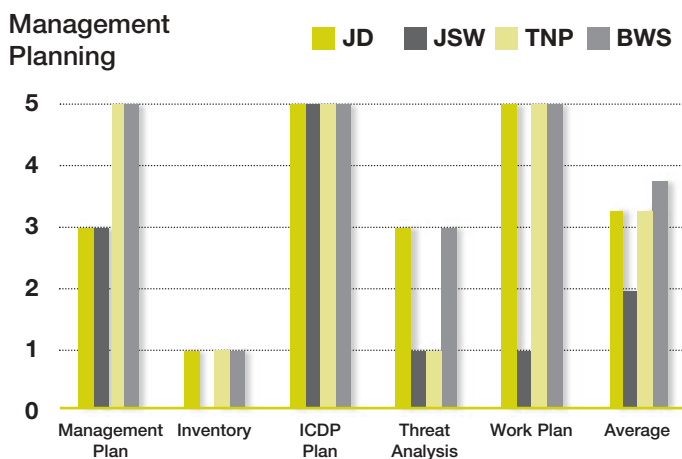
Erosion from road construction

Photo: © WWF/J.Ervin

PROCESSES

The next part of the section of the questionnaire focuses on understanding the management processes at work within the protected areas. The processes include management planning practices, decision making, financial management, and research, monitoring and evaluation.

MANAGEMENT PLANNING



a) *There is a comprehensive, relatively recent written management plan.*

All four protected areas had comprehensive management plans. Two were very recent (2002–2007), one was in the process of being updated (1997–2001), and one had an 18-month pilot management plan. Park managers felt the management plans were comprehensive (all had external support in creating the management plans, from WWF, UNDP, and DANIDA). However, two park managers noted that in their view, the management plans were very vague, and did not pay adequate attention to the biodiversity resources within their parks.

The protected areas are in different situations with regard to planning. JDNP, the second national park to be established after RMNP, has a 'first generation' management plan. The plan is based on surveys, with considerable consultant input, and is unrealistically ambitious in its scope. BWS and TNP have recently completed their management plans, which have been prepared through a consultative process involving park staff, geogs and districts, and NCD headquarters. They are based on more thorough

biodiversity and socio-economic surveys, produced with consultant input. JSWNP has a pilot management plan, which has been wholly prepared by the Bhutanese staff. It outlines a programme of surveys and consultations necessary to produce a full management plan which will be prepared to coincide with the ninth five-year plan of the country. As there have been only limited biodiversity surveys to date, the management planning process in BMNP is considered to be less developed than in the other protected areas. All management plans are thought adequate in expressing a vision on biodiversity conservation in its social, economic, and institutional context.

b) *There is an up-to-date resource inventory, including maps of the area.*

This question scored very low, with no park manager satisfied with the natural resource inventory within his park. While all had an impressive list of species as an appendix to their management plans, these were based on expected rather than actual presence or absence of species. Even for the handful of key species identified as conservation targets, there was no information about actual populations, reproductive rates, critical habitats, resource needs, breeding requirements, or impact of poaching and other human activities. The lack of a meaningful natural resource inventory is one of the fundamental and most pressing weaknesses of the entire protected area system.

c) *An ICDP plan has been completed for the protected area.*

All park managers saw the development and implementation of an ICDP plan as an essential component of park management. Each had spent considerable time and resources in developing their ICDP plans. Although none had actually been implemented yet, all were scheduled to begin an implementation phase from July 2002.

d) *There is an analysis of and strategy for addressing, protected area threats and pressures.*

While some preliminary threat analysis existed (mostly on grazing), this focused on steps to

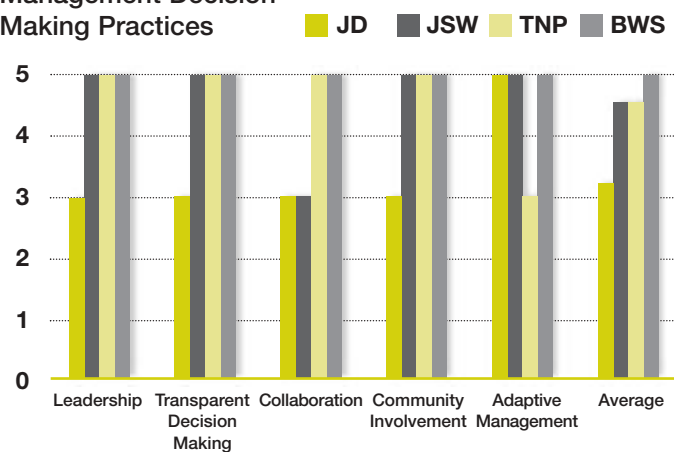
address grazing, but did not include an assessment of the impact of or distribution of grazing. None of the parks had a systematic analysis of the full range of threats.

e) *Annual workplans specify goals and targets to achieve management objectives.*

Overall, this question received a high score. One park manager reflected that workplans for staff were developed on a monthly, rather than annual basis, and that wardens did not have specific workplans.

MANAGEMENT DECISION MAKING

Management Decision-Making Practices



a) *There is clear leadership and strong teamwork among staff.*

Three park managers answered an unequivocal yes; one noted that there was room for improvement. In general, park managers, wardens, and other staff expressed a sense of teamwork, and mentioned their close camaraderie. This is especially true for small teams in isolated conditions.

b) *Management decision making is transparent.*

Park managers and staff felt that decision making was transparent. One warden noted “We meet monthly to discuss the next month’s plans, and we make decisions together.”

c) *Protected area staff regularly collaborate with partners, local communities, and other organizations.*

Although collaboration was generally high (indeed, close collaboration with WWF, RSPN, and local communities was readily evident), park

managers identified three areas for improvement:

- ◆ better coordination with NCD headquarters
- ◆ better communication and collaboration with district officers
- ◆ better coordination with other protected areas within the country.

d) *Local communities participate in decisions that affect them.*

Park managers felt that local community participation was a strength, particularly in identifying ICDP activities. One park manager expressed some hesitation: “In the end, we still retain decision-making authority over issues that directly affect them, like compensation for livestock depredation. And for some things it is hard to involve the communities, like directives from NCD.”

e) *Management planning continually incorporates and adapts to new learning.*

Although most of the park system itself is quite new (most of the parks are less than a decade old), management planning has already been adaptive to new learning.

FINANCIAL MANAGEMENT

Financial Management



a) *There is adequate funding to conduct all critical management activities.*

Overall, existing funding is adequate for the needs of the parks. One park manager noted that additional funding was needed for equipment and infrastructure. However, three park managers quickly qualified their answers by noting that their situation would change quickly as funding cycles came to an end. It should be noted that this score does not necessarily reflect



Village adjacent to JSW National Park

Photo: © WWF/J.Ervin

staff capacity to spend funding. In many cases, park managers returned funds at the end of the fiscal year or requested that they be allowed to carry over funding into the next fiscal year, because they had been unable to spend their allocated budgets.

b) Financial management practices enable efficient and effective protected area management.

Of all the assessment indicators, this one generated the most discussion; the topic came up in nearly every conversation regarding park management. “We definitely have a problem,” remarked one park manager. “We have major delays in getting paid, up to six months or more,” commented another. In one case, a park manager described having to drive two days (one way) to Thimphu in order to be sure his request for funding was expedited. Such inefficiencies marked the financial management of parks, although many of the factors leading to this inefficiency were beyond the control of protected area managers themselves.

There are several conditions that exacerbate the financial management problems:

- ◆ Funders have strict guidelines regarding reporting and release of finances, and are often viewed as inflexible and dogmatic by park managers.
- ◆ Field projects often experience delays due to factors outside of the park managers’ control.
- ◆ These delays mean that financial reporting is also delayed, further aggravating the problem.
- ◆ Many district offices view the park as a source of income, and pressure park managers to spend money on unbudgeted activities.
- ◆ Only one park has an accountant; the others have centralized and inefficient accounting procedures.

- ◆ The path of funds from donors to park managers, and the path of information from park managers to donors, is lengthy and circuitous, involving as many as six or seven different stages, ministries, and organizations.
- ◆ Some park managers, although they recognize the importance of reporting and financial management, are too busy facing urgent crises because of staff shortages, to pay due attention to financial issues.

Inefficient financial management has taken a heavy toll on park management – low morale regarding funding, lengthy and frequent delays, projects half finished, and frustrated donors are just some of the outcomes. This indicator is second only to staff shortages in causing ineffective park management.

c) The allocation of expenses is appropriate to protected area priorities and objectives.

Allocation of expenses scored much higher than efficiency of financial management. However, one park manager noted that donor priorities heavily influenced financial and management priorities. Another noted that there were budget constraints because of unrealistic expectations of multiple stakeholders.

d) Short-term (1–5 years) funding of the protected area is secure.

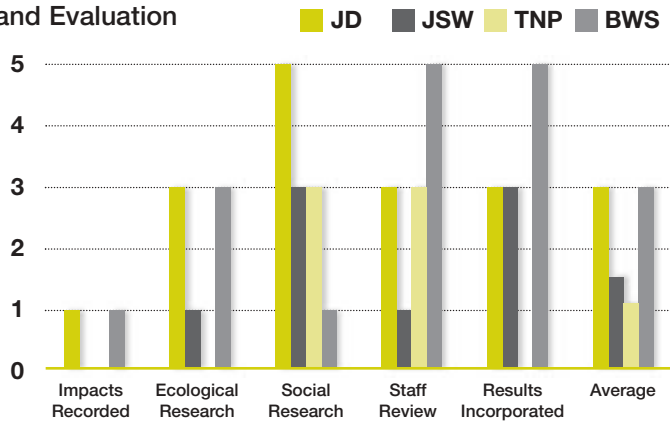
Short-term funding in the future is uncertain, as most of the protected areas are approaching the end of their funding period. Only one park manager felt that his park had relatively secure funding for the next several years (TNP is directly supported with a five-year grant from WWF). Although short-term funding is not secure it was generally felt by park managers that once project proposals are fully developed funding opportunities would be forthcoming.

e) There is a plan for long-term financial sustainability.

While funding for the short term needs to be explored, all park managers are confident that the Bhutan Trust Fund will be able to largely take care of the long-term financial sustainability. It is important that the NCD also explores other sources of funding, allowing the trust fund to build up reserves.

RESEARCH, MONITORING, AND EVALUATION

Research, Monitoring and Evaluation



a) *The impact of legal and illegal uses of the protected area are accurately monitored and recorded.*

The impacts of uses of the protected area are generally not monitored. Several park managers noted that they thought it would be very useful to have a consistent format for monitoring, and felt that this was a service that NCD could provide. One park manager lamented “We don’t have nearly enough staff, we don’t have a detailed map of the park, no one knows how to do GIS analyses, and we simply don’t have the skills needed to do this kind of monitoring.”

b) *Research on key ecological issues is consistent with the needs of the protected area.*

Although there have been some small-scale research projects (e.g. on black-necked cranes in BWS and on snow leopard, tiger and *Cordyceps* in JD), there is no systematic research programme or protocol. Research needs are not identified, and key ecological research skills are lacking.

c) *Research on key social issues is consistent with the needs of the protected area.*

Social research fared much better than ecological research. As part of the ICDP development process, a socio-economic survey was conducted in all but one protected area. Park managers felt these surveys were adequate for their needs. However, two managers identified the lack of research on NTFPs as a major gap, especially given the extent to which

medicinal plants are harvested, and to the pressure which NTFPs are likely to be under in the future.

d) *Staff performance and progress on targets are periodically reviewed.*

Although this indicator scored fairly well, three park managers noted that they were referring to annual “civil servant assessments,” which they felt were inadequate to their needs. Two park managers felt NCD should provide a common approach to staff monitoring. One remarked that monitoring on progress takes place monthly. Another added that his staff was too overloaded to take on responsibilities for monitoring other staff.

e) *The results of research and monitoring are routinely incorporated into management planning.*

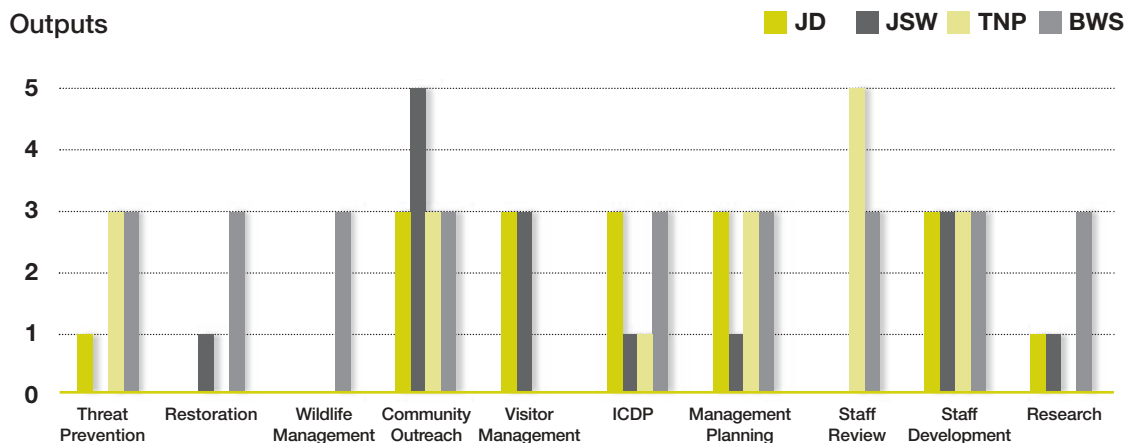
Park managers routinely attempt to integrate new information into planning. However, they are limited by the quality and availability of data, particularly relating to biodiversity issues.



Park warden

Photo: © WWF/J.Ervin

OUTPUTS



This section looks at the accomplishments from planned and unplanned activities.

The graph summarizes the management outputs of the previous year, as viewed by park managers. While these data are based on a simple self-assessment by park managers, they do reflect the broader trends from the management assessment. Specifically, strong outputs include community outreach, staff development (i.e. training), management planning, and ICDP planning. Weaker outputs are those areas related to a paucity of data, including research, wildlife management, threat prevention, and restoration. Average scores, ranging from 0 to 5, are included for each output. A score of 3 or higher is considered satisfactory.

The newly established protected areas have only partially taken up protected area management activities. In JDNP there is concern that the regular conservation activities such as patrolling, research, and monitoring have been somewhat neglected as most emphasis was put on development of the ICDP. In JSWNP the situation is thought to be more balanced, though here territorial activities are yet to begin. All parks give high importance to ICDP activities, and have invested considerable effort in identifying ICDP programmes, initiating pilot activities, and developing a planning-implementation-evaluation cycle in cooperation with district administrations. Awareness activities and environmental education have received relatively less attention in the past but it is now reflected in all the park annual plans.

The parks which have recently become operational, BWS and TNP, have better achieved their planned work programmes, as they both have been guided by good plans in their start-up phase (establishment of the park organization and its basic requirements and preparation of management plans). The TNP, in particular, has a reputation of implementation according to plan. On the other side, JSWNP is more hampered in effective implementation because of a complicated project management structure. At the level of field staff, achievements are often difficult to assess because until recently in most parks workplans were not communicated down to warden level. However, at present, a system appears to be in place whereby wardens are expected to prepare and be responsible for their own workplan, based on the park’s workplan.



Thrumshingla National Park

Photo: © WWF/J.Ervin

PRESSURES AND THREATS

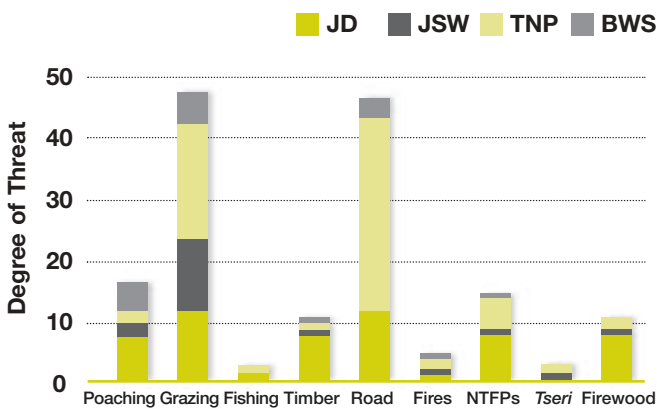
During the first phase of the assessment each protected area generated a list of pressures and threats each park faced, giving a score and a trend to each. The assessment using the WWF RAPPAM Methodology focused more on determining the degree and magnitude of each threat and pressure.

The major threats and pressures facing the four protected areas are poaching, grazing, road construction, and collection of NTFPs.

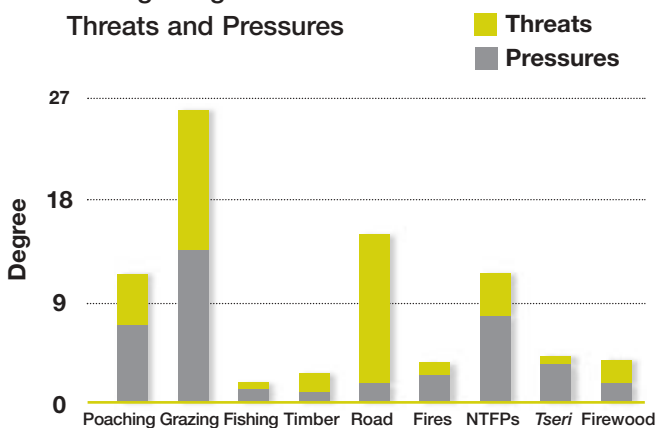
Minor/moderate threats include timber felling, fishing, *tseri/pangshing* cultivation (slash-and-burn agriculture), firewood collection, and forest fires.

Note: an individual threat or a pressure may have a score ranging from 1 to 64. The score is derived by multiplying three scores (extent, impact, and permanence), and therefore is not a linear scale. A score of 1–3 can be considered mild, 4–9 moderate, 12–24 high, and 27–64 severe.

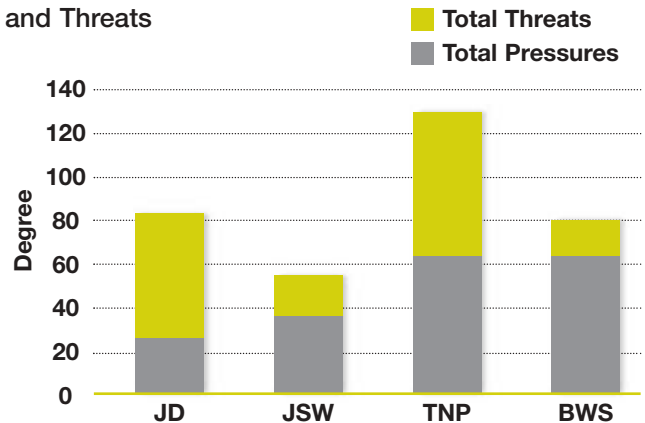
Overall Degree of Each Threat



Average Degree of Threats and Pressures



Cumulative Pressures and Threats



POACHING AND KILLING

The high commercial value of certain species attracts poachers, and poaching is a direct threat to several species in the protected areas. Besides poaching for commerce, human/wildlife conflicts also exist because of the damage wildlife causes to agricultural crops and livestock. This often results in retaliatory killing of some wildlife species.

Prominent species poached for commercial trade include musk deer, tiger, black bear, and *Cordyceps sinensis* (known as the Chinese caterpillar). Pheasants are killed for local consumption. Species trapped, poisoned, and shot in order to protect crops from predation include wild boar, elephant, monkey, and bear, while livestock predators include tiger, leopard, and wild dog.

Poaching for commercial trade is generally influenced by markets outside the country. The activity is conducted by outsiders (generally Indian and Tibetan nationals) as well as local residents. Poaching for consumption, especially of pheasant, is mostly conducted by road workers, many of whom live within or close to the forest.

The protected areas do not have adequate human resources necessary for law enforcement, making it difficult to have an effective anti-poaching strategy. Data regarding the degree of poaching and killing are also generally inadequate, although there are some figures (e.g. park officials apprehended 194 musk deer poachers in JDNP during a single year). However, the populations of species killed, and the impact of poaching and killing are unknown.

The level of livestock killed by wildlife is considerable, and park managers generally feel that local communities bear a heavy cost as a result, especially for many households who are almost entirely dependent on livestock herding. While this level of livestock depredation places a burden on local communities, it may also mean that some species, particularly those in marginal habitats or at the extent of their distribution range, may depend on occasional livestock to supplement their diet. This is also reported in the national tiger conservation strategy (McDougal and Tshering, 1998) where the natural prey base for tigers is supplemented by livestock. This could be one of the reasons for the presence of tigers in high altitude areas. All four park managers also noted the escalation of human/wildlife conflicts, particularly relating to crop damage by wild boar. NCD is embarking on programmes to address such issues through a wild boar project and tiger project.

GRAZING

Almost all of the local residents of the four protected areas are dependent on agriculture and livestock for their sustenance. In many areas, agriculture is not possible due to the high altitude, and communities depend on livestock (mainly yak) for their livelihood. Grazing can have a big impact on these fragile ecosystems. Holding large numbers of cattle and yak herds is still considered a status symbol. Traditional migratory grazing, which is prevalent in all four protected areas, is respected by park management. There are a number of key issues related to grazing.

Grazing has been the largest pressure in the past, and poses the most significant overall threat in the future for all four parks. Grazing is by yaks, cows, and sheep, herded by both semi-nomadic and residential communities.

All of the existing ICDP plans explore options for reducing grazing. Specific measures include:

- ◆ replacing current livestock with more productive breeds
- ◆ improving pasture management through prescribed burning and livestock control
- ◆ promoting stall feeding and the use of fodder species.

Grazing has been an activity long associated with each park, and since there is no clear understanding about the degree of impact, all four park managers expressed some reservation about categorizing grazing as a threat. Yet they also recognized that there were negative impacts from grazing. "I know when it is really bad when I see it," remarked one park manager, "but I can't really say at what point it starts becoming bad." The historic nature of grazing further compounds difficulties in collecting data on actual impacts. Remarked one park manager, "We would collect data on grazing, but we just don't have any baseline data for what we're supposed to be measuring against."

It is clear that the frequency, intensity, and scale of grazing vary within and between each park, and therefore the degree of impact from grazing varies considerably. However, there is no clear mechanism of determining the actual degree of impact within any one area, nor are there any baseline data from which to detect changes.

In some areas within parks, grazing had increased dramatically because sensitive areas were being grazed more intensively, without adequate recovery time. One park manager remarked, "We have yaks grazing here in one part of the year, and then cows in another part of the year, and sometimes they're both grazing at the same time. And every year it seems like it's more and more!"

Grazing policies add to the uncertainty and anxiety about grazing in park. Commented one park staff, "Range lands are a limited resource, and we can't assume that everyone who wants to graze will be able to do so in the future, even though they are supposed to be able to. Every year it's increasing. Sometimes the government gives families some yaks which adds further pressure on the park."

FISHING

While hunting is banned throughout the whole country, fishing is permitted, but only with a licence. Strict regulations on fishing are enforced to avoid over-exploitation of species. Population levels of fish in the rivers, especially brown trout, are believed to be quite low. During the winter months, from December to February, fishing is banned altogether. Fishing regulations also ensure that it is not permitted during certain auspicious Buddhist

days and also within a certain distance of monasteries. Fishing is a minor activity, and is mainly conducted by residents within the park and buffer zone for personal consumption.

Wardens and park managers noted that fishing was characteristically benign, using simple equipment rather than large nets and explosives. Little is known about the fish population and its diversity. Park managers felt that research, monitoring, and control of fishing was a low priority.

TIMBER FELLING

Timber is felled primarily for the construction of houses and roofing shingles. While families are allowed to replace timber for house construction every 30 years, shingling takes place every three to five years. Because of the presence of the disease heart rot in some areas, such as JSWP, many trees are cut indiscriminately, and there is a high degree of waste – one park manager estimated that two out of every three trees cut for shingles are wasted.

Illegal timber felling is not considered a threat in any of the four protected areas, although a small degree of illegal harvesting has been reported at JSWNP and BWS. (Illegal timber felling is considered a high pressure and threat in the protected areas and forests close to the southern border of the country.) However, the number of trees legally felled has increased over the years, due to increased construction activities, mostly for service infrastructure such as schools, hospitals, monasteries, roads, and tourism facilities.

ROAD CONSTRUCTION

Road construction, in the form of road widening, constitutes a major threat, but only to TNP. Road construction is only a moderate threat to JDNP, a very minor threat to BWS, and no threat to JSWNP, although there are concerns raised for the buffer areas.

The TNP is the only protected area with a major road running through its core area. This road is undergoing an extensive widening process. Previously, travellers from eastern Bhutan to the western part and vice versa travelled via a southerly passage through India. Because of the political troubles in the state of Assam in India, this route is now considered too dangerous, and the

country's only east–west highway runs directly through TNP. In addition to the road widening, three new bypasses are planned within some sensitive areas of the park.

Roads within the parks have both direct and indirect impacts. Direct impacts include soil erosion, stream siltation, salt runoff, and direct loss of habitat. Indirect impacts include the increased presence of road workers, increased traffic, and wildlife impact, and increased access and vulnerability to threats such as poaching and NTFP harvesting. The roads also require constant maintenance, and as a result, road workers have semi-permanent housing at intervals along the road. In several cases, these workers were the largest source of blood pheasant poaching.

Environmentally sensitive road construction is mandatory and is monitored by the National Environmental Commission. Silent blasting techniques are encouraged for the road construction processes within TNP and JDNP.

FIRES

All fires are caused by humans and happen during the dry winter months. A large-scale forest fire has not occurred in any of the four protected areas in recent history. However, fires cannot be ruled out as a future threat, especially with increasing human activity within the parks.

Discussions with park managers highlighted that many park staff hold conflicting beliefs about fires. While the official policy focuses on fire suppression, many saw the potential benefits of controlled fires, including improved grazing, potential forest restoration, and the potential for lemongrass cultivation in some ecosystems. There is no research or data regarding either the effects of fires, or the effects of fire suppression in any of the parks.

NON-TIMBER FOREST PRODUCTS

The prominent NTFPs in the four protected areas include mushrooms, cane, bamboo, medicinal plants, and incense for domestic use, as well as for local and international trade. Most of the NTFPs collected are usually for personal consumption. The park management sees the collection of NTFPs as one means to improve the income of the local residents.

Although none of the park managers saw NTFPs as anything more than a minor threat, JD is expected to see an increase in NTFP use. TNP also plans to see an increase, especially in the collection of *matsutake* mushrooms, which have a high local and international demand. This low degree of threat, however, may be attributed to a lack of park manager knowledge regarding the extent and type of use of NTFPs within their parks. In two separate parks, managers claimed that NTFP use was very low to non-existent, while the wardens in both those parks portrayed a different picture. “It’s hard to say, but I was talking to one man from the community, and he said NTFP use was very high in this park,” said one. Another said “NTFPs are showing up in the local market, and you have to ask, where are people getting these from?” One external stakeholder commented “NTFPs are very important here. Because farmers rely on subsistence farming, cash, food, and medicine are in short supply. The terrain is difficult, and there is a growing market for NTFPs. So of course villagers depend on these. And there is a very high value on some medicinal plants, especially those at high altitudes. NTFP collection is very much a threat!”

Several donors and policy makers remarked that the development of projects for the sustainable management and marketing of NTFPs was a major opportunity for sustainable development, and they hoped to pursue such plans within their own organizations.

OPPORTUNITIES AND STRENGTHS

While several threats are recognized there are also opportunities and strengths which can be used to reduce or mitigate these threats. ICDPs for the protected areas are a major strength in addressing threats. Environmental awareness programmes in the local communities also are gaining momentum. There is also a high degree of commitment and

TSERI/PANGSHING CULTIVATION (SLASH-AND-BURN CULTIVATION)

Tseri (burning in vegetated areas) and *panshing* (burning in dry land) cultivation are old agriculture practices which are slowly being phased out. They appear to have been a mild to moderate pressure in the past, and are currently almost non-existent threats in all four parks. In some areas, such as TNP, the park manager felt that there were simply no more areas where such cultivation could take place. Others felt that government policies strongly discouraged future cultivation. In some ICDPs previously cultivated *tseri* areas were recommended for the cultivation of NTFPs and other products.

The degree to which such practices have had an impact differed from park to park. In BWS, for example, the pressure has been more severe than in TNP, primarily because older, larger trees had been cut.

FIREWOOD COLLECTION

Wood is still the primary fuel for cooking and heating in all four protected areas. Overall, firewood collection in the past has been a mild to moderate pressure in the parks. It is considered as only a mild threat in the future, with the increase in electricity coverage and the promotion of electric cooking and heating appliances. Residents within the park and buffer zone may currently collect unlimited quantities of dry fallen wood without a permit.

motivation on the part of the park staff. Other opportunities include the out migration of residents from the protected areas, ecotourism and bio-prospecting. However, if not properly implemented bio-prospecting and ecotourism programmes can have adverse impacts.

VULNERABILITY

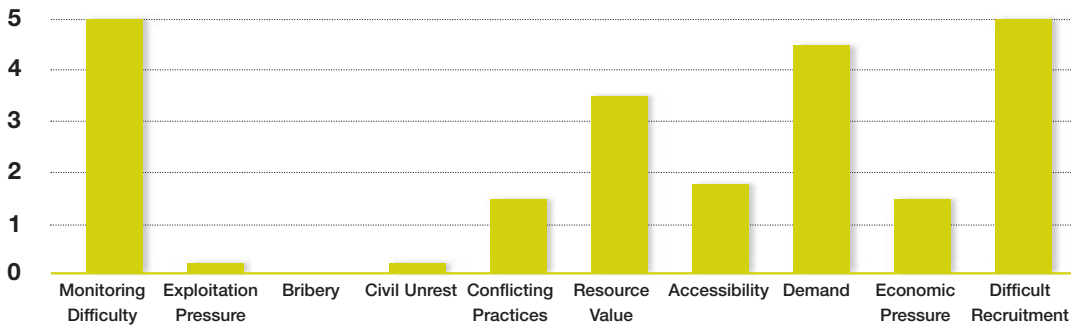
Factors taken into consideration in assessing the vulnerability of the protected areas are:

- ◆ difficulty of monitoring illegal activities in protected areas
- ◆ low law enforcement
- ◆ bribery and corruption
- ◆ civil and political instability
- ◆ conflict between cultural practices, beliefs, and traditional uses and protected area objectives
- ◆ high market value of protected area resources
- ◆ easy accessibility of the area for illegal activities

- ◆ strong demand for protected area resources
- ◆ protected area under threat to unduly exploit protected area resources
- ◆ difficulties in recruiting and retaining employees.

Of these ten aspects of vulnerability the major ones were difficulty in monitoring, the high value of resources, high demand, and difficulty in recruiting and keeping staff. On average, the four protected areas show a moderate degree of vulnerability.

Average Vulnerability of All Four Protected Areas



Effects from traditional levels of grazing

Photo: © WWF/J.Ervin

RECOMMENDATIONS

These recommendations are based on the problems highlighted in the findings and analyses of the pressures, threats and weaknesses in management effectiveness.

While there are many areas that might be improved, the following recommendations have

been prioritized so that action plans can be developed. The recommendations are intended to inform NCD and other stakeholders about the problems and emerging threats and provide specific ideas for improving management effectiveness of Bhutan's protected area system.

MAJOR CONCERNS NEEDING IMMEDIATE ATTENTION

STRENGTHENING ANTI-POACHING AND LAW ENFORCEMENT MEASURES

Poaching has been seen as one of the major pressures and threats of the protected areas. The presence of several species of flora and fauna with high commercial value on the international market has influenced the amount of poaching. If law enforcement is not strengthened and strict measures put in place to curb poaching Bhutan may lose valuable species of wildlife within a short period of time. Hence it is important that counter measures are enforced. For this it is recommended that the NCD develop more effective mechanisms for detecting and preventing poaching activities. Specific measures include: involving local forest guards, monitoring local markets, hiring adequate number of field staff, strengthening transboundary agreements with India and China, and developing effective anti-poaching strategies. Law enforcement can be improved primarily through an increased presence of field staff. It is also necessary to determine the impact of poaching and killing on target species, including musk deer, black bear, *cordyceps*, blood and alpine pheasant, wild boar, tiger, leopard, and wild dogs. An anti-poaching strategy, addressing all the above issues, should be developed and implemented immediately.

UPDATING RESEARCH ACTIVITIES

The assessment has shown that very little research is undertaken, leading to insufficient data for the proper scientific management of protected areas. Baseline data need to be developed so that future surveys and research have a reference point. For example, grazing is thought to be a problem. It will be necessary to undertake research in this field to fully understand its impact. Protected area managers will need to develop a grazing mitigation pilot programme. It would also be useful to develop simple tools for assessing and monitoring the impacts of grazing. Involve local communities in the review of ICDP and zoning policies regarding grazing in core areas and grazing mitigation programmes. Other areas of research could include studying the ecological impact of long-term fire suppression in fire-dependent ecosystems (e.g. Chir Pine forests). Similarly, the ecological implications of bark beetle suppression need to be investigated. Studies on aquatic life also need to be undertaken.

There is vast scope to conduct research in the protected areas. Natural resource inventories in all the protected areas need improvement. The species/research section and the inventory/data management sections of the NCD will have to identify the research needs and then prioritize them

to conduct effective research rather than attempting to work on all issues at once and therefore failing to achieve anything concrete. The two sections should collaborate with the Renewal Natural Resource Research Centres (RNR-RCs) of the Ministry of Agriculture. Appropriate field equipment will need to be provided to undertake the research.

GAINING LOCAL COMMUNITY SUPPORT THROUGH CREATING OPPORTUNITIES AND BENEFITS

The communities living in the parks play a vital role in the conservation of biological diversity. Without their support and cooperation management efforts in the protected areas will be futile. Only when local people share a sense of ownership of these resources will they begin to work towards sustainable utilization. Human/wildlife conflicts should be reduced by working on compensation schemes and related programmes acceptable to the local community. Park managers should work closely with local communities to identify and implement programmes that address conservation needs while fulfilling the developmental aspirations of the local communities. Ecotourism opportunities should be developed as a source of income for local people. A strategy for addressing ecotourism specifically in the park system should be developed. Such a strategy would complement the recently published national ecotourism strategy (published in collaboration with WWF-Bhutan), but would explore in greater depth the implications and opportunities for Bhutan's park system. A set of ecotourism guidelines for park managers within each park needs to be developed. The management planning and the integrated conservation/development programme section of the NCD should coordinate and collaborate with the parks in identifying and implementing the ICDPs. Support from local people can, to some extent, reduce the workload of park staff and thus help reduce the burden of understaffing.

ZONING

Dividing protected areas into three zones – core, multiple use and buffer – and according management prescriptions to the zones will be required to manage the protected areas scientifically. Currently no protected areas have

actually fully demarcated their zoning system on the ground, though the need and means to do this have been outlined in all the management plans. Without proper zoning it will be difficult to apply the regulations and there is a risk of degrading core habitats. Consistent zoning practices and policies will need to be applied across the entire protected area system. It will be essential to develop a common but flexible approach to park zoning, involving local communities at the earliest possible stage.

FINANCIAL MANAGEMENT PRACTICES

All the protected areas have lots of activities lined up for which timely release of funds is important. Long delays in accessing required funds have been highlighted as a constraint by the park managers. While there are certain financial procedures to follow a way to alleviate financial delays should be sought. All accounts should be decentralized to the respective protected areas instead of having them at the ministry. The NCD should assist the parks in avoiding delays.

AVAILABILITY OF EQUIPMENT AND FACILITIES

Additional facilities need to be provided for field staff to be able to accomplish their task. Ineffective communication within and between the parks is a weakness. Adequate communication means and reporting structures at all levels, including between NCD and park managers; among park managers themselves; and between park managers, wardens and guards, needs to be ensured. Equipment will need to be installed to make communication more effective. To conduct effective research and surveys it will be necessary to have the appropriate equipment.

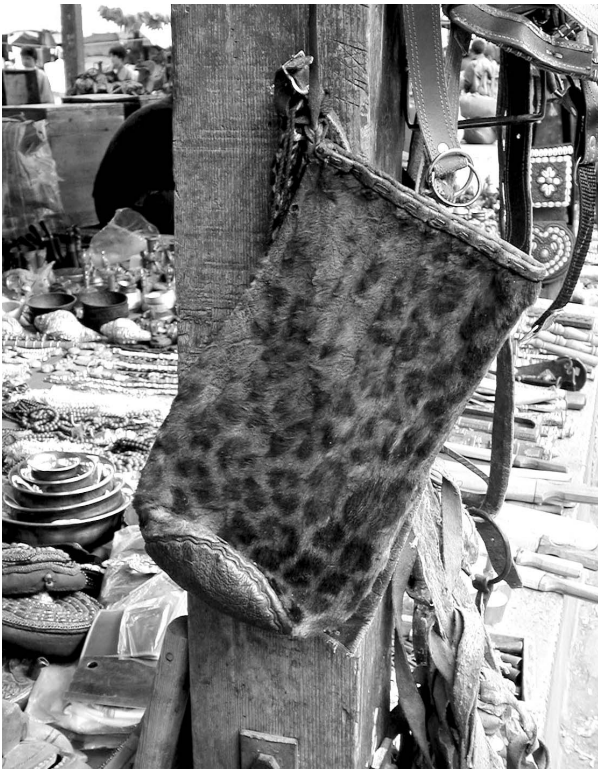
STRENGTHENING THE NATURE CONSERVATION DIVISION

The main responsibility of the NCD is to provide technical support to the protected areas. It is important for the NCD officials to have the required skills to provide this support. A good human resource development plan should be developed and implemented that can give NCD and protected areas staff opportunities to acquire skills and increase their capabilities.

CONCERNS NEEDING TO BE ADDRESSED IN THE NEAR FUTURE

SUSTAINABLE HARVESTING OF NTFPS

The market has created a shift in demand for NTFPs from personal consumption to a more commercial level. Obviously this creates much greater pressure on wild resources. It is necessary to understand the degree of NTFP harvesting within parks, and the impact on harvested species. Pilot projects on developing sustainable management guidelines and marketing programmes for one or more high value NTFP species should be developed. Potential domestic partners include the National Institute of Traditional Medicine and the Department of Research and Development Services; potential international partners could include WWF-UK and the Rainforest Alliance, both of whom are establishing programmes in the sustainable harvesting and marketing of medicinal plants.



Bag made from leopard skin

Photo: © WWF/J.Ervin

CONSTRUCTION

The feasibility of reducing the degree and impact of new road construction in TNP, JDNP, and BWS should be explored. Parks should limit new construction and impose the use of best road construction practices.

FIRE MANAGEMENT

The impact of fire on the ecosystem should be studied. A pilot project could be developed to explore the possible ecological and social benefits of controlled burning (e.g. lemon grass cultivation, improved grazing).

BIO-PROSPECTING

If carefully surveyed there is every possibility that the forests of Bhutan will be found to be harbouring several species of plants with huge commercial value for international pharmaceutical companies. Mechanisms should be in place to safeguard against bio-piracy, including full legal protection of genetic resources, particularly of medicinal plants and wild food relatives, as well as protection of intellectual property rights, such as traditional knowledge of plant properties. Ensuring that such mechanisms are in place before establishing projects aimed at the management and marketing of such resources is vital.

CONTINUAL ASSESSMENT OF PROTECTED AREAS

This assessment of the protected areas to evaluate management effectiveness has produced a lot of data for planners to use in advising protected area managers. It has provided a good understanding of the status of the protected area. The data will be very useful for making suitable management modifications. The management planning section of the NCD should undertake such assessments once every two to three years.

FOLLOW-UP ACTION

Much valuable information has been generated from the assessment which can be used for making sound management decisions. The information gathered from the assessment has already been used for drafting a vision and strategy document for the Nature Conservation Division and the protected areas concerned.

The Nature Conservation Division will, however, need to make a plan of action to implement the recommendations that have been suggested.

A workshop with the park managers and other staff of the protected areas should be convened to discuss the methodology and, if necessary, make suitable amendments for conducting future assessments. But, more fundamentally, the process of implementing the recommendations needs to be agreed upon. How these recommendations should be accomplished, who will do them, and when they should be done, will be some of the factors to consider in agreeing how to execute the recommendations effectively.



JSW National Park

Photo: © WWF/J.Ervin

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The following people have provided invaluable support in the development of this case study: Alexander Belokurov, Alexei K Blagovidov, Dr Di-Qiang Li, Jamison Ervin, Dr Peter Goodman, Barry James, Devendra Rana, Vyacheslav Trlyshkin, Dr Sangay Wangchuk, Dr Zhou Jianhua.

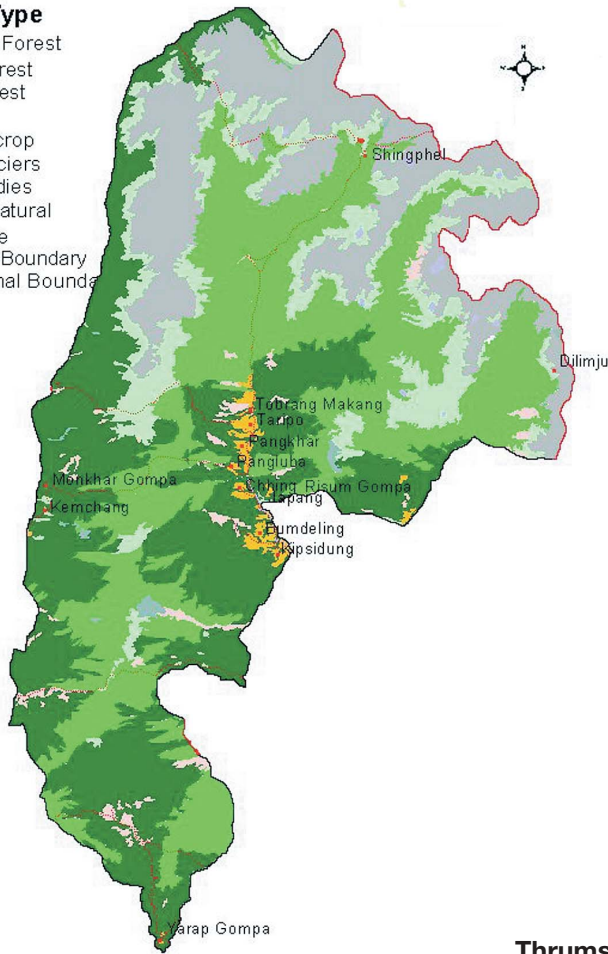
ACRONYMS

BFI	Bhutan Forestry Institute
BWS	Bumdeling Wildlife Sanctuary
DANIDA	Danish Development Assistance
Geog	Local district authority (usually containing a number of villages)
GIS	Geographic Information System
GPS	Global Positioning System
ICDP	Integrated Conservation and Development Programme
JDNP	Jigme Dorji National Park
JSWNP	Jigme Singye Wangchuk National Park
NCD	Nature Conservation Division
NRTI	Natural Resources Training Institute
NTFP	Non-Timber Forest Product
RAPPAM	Rapid Assessment and Prioritization of Protected Area Management
RMNP	Royal Manas National Park
RSPN	Royal Society for the Protection of Nature
TNP	Thrumshingla National Park
UNDP	United Nations Development Programme
WWF	World Wide Fund For Nature

Bumdeling Wildlife Sanctuary

Vegetation Type

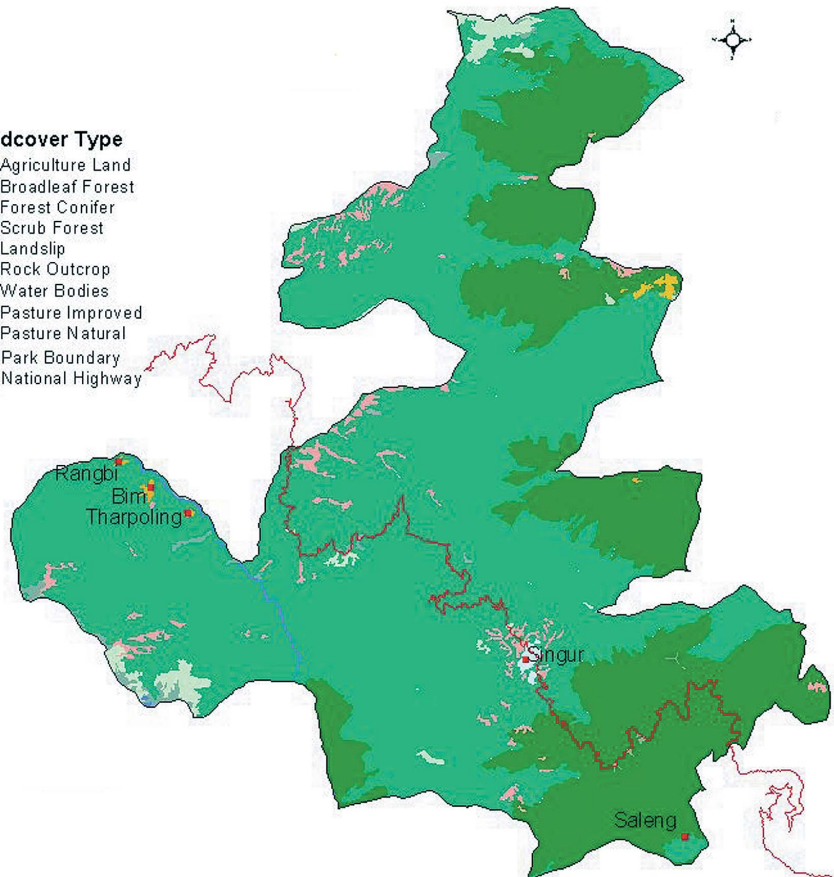
- Broadleaf Forest
- Conifer Forest
- Scrub Forest
- Landslip
- Rock Outcrop
- Snow/Glaciers
- Water Bodies
- Pasture Natural
- Agriculture
- Sanctuary Boundary
- International Boundary
- Trail



Thrumshingla National Park

Landcover Type

- Agriculture Land
- Broadleaf Forest
- Forest Conifer
- Scrub Forest
- Landslip
- Rock Outcrop
- Water Bodies
- Pasture Improved
- Pasture Natural
- Park Boundary
- National Highway



Bhutan



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