

GRAZING MANAGEMENT IN NATIONAL PARKS AND PROTECTED AREAS: SCIENCE, SOCIO-ECONOMICS AND LEGISLATION (TENURE)

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Abstract

The formulation of natural resource management policy generally involves science, socio-economic environment and legal framework. The thrust of the management policy is to derive maximum benefits from the natural resources while at the same time ensuring that the ecological integrity is not compromised. The basic scientific process elements such as ecological stability, resistance levels, resilience, restoration, enhancement, and carrying capacity have been discussed in relation to livestock grazing. These processes determine the sustainability of the pastures under use.

The socio-economic environment under which a policy is framed and implemented has a direct bearing on the effectiveness of the policy. Besides formal laws, important elements that have influence on the use, access and sustainability of pastures are social structure, the role of the livestock in the socio-economic development, social organizational capability, flow of physical and social energy within and outside the communities, hierarchical structure of the communities, and patron-client relationship. Therefore, it becomes difficult for most of the formal laws to change the relationships relating to resource use and access patterns among the communities once such relationships are embedded in the social structure.

The laws of the country such as the Thrimzhung Chhenmo, the Land Act, the Forest and Nature Conservation Act and the

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National Assembly resolutions protect property rights over pastures. Besides such laws, customary sanctions on the use of and access to pastures have also evolved over the years. To amend such laws involving property transfer rights from private to state or common may be a complicated process as proven in the past. Some examples are nationalization of pastures and sharecropping. More innovative approaches will be necessary to rationalize the relationship between productivity of natural resources, and property rights ownership.

Introduction

Grazing by livestock has been an important issue for the management of the national parks and protected areas. Generally, it has been observed that grazing has negative impact on the ecological stability of the grazing area, albeit at varying levels. This impact results primarily from two sources- browsing of the ground flora and erosion as a result of hove marks. Several studies have been carried out to assess the impact of grazing on the resiliency of the ecosystem. While most studies have revealed that there is a negative impact on the eco-system, the issue of separating it from the resource use patterns of the rural households and communities has been difficult to reconcile.

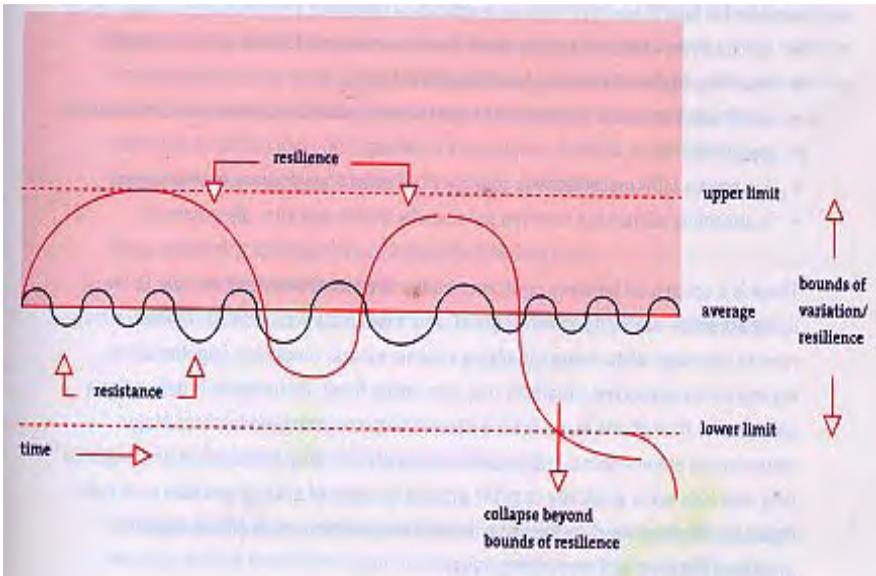
It must be recognized that livestock is a part of rural livelihood, and it forms a part of the fabric that links other elements of socio-economic structure of individual households and communities. The traditional livestock species has evolved to adapt to rugged and a wide range of areas available for grazing. This has resulted in the adoption of tending and management practices that involves minimum inputs, particularly the practice of letting the livestock stray into the forest without any restraint.

Individuals, households, communities, *dratshang* (state monastic body), etc have grazing rights over pastures that may be inside or outside national parks and protected areas. These rights are legitimated by the Thrimzhung Chhenmo,

the Land Act of 1979 and the Forest and Nature Conservation Act of 1995. The National Assembly has also often passed resolutions relating to ownership and management of grazing land/pastures from time to time. All these rights are recorded in the main *thram* (land register) maintained by the Ministry of Home Affairs and a copy held by the owner. Therefore, the property rights regime relating to grazing/pasture is unambiguous.

Ecological Stability/Integrity

Fig. 1: Ecological Stability and Bounds of Variations /Resilience



Adopted from SEAN

The two final goals of eco-system management are stability and diversity. Ecological stability can be defined as the capacity to maintain a certain level of optimum productivity, thus the capacity to buffer and regulate disturbances and variation of determining conditions. Stability includes both the concepts of resistance and resilience.

Resistance is a system's capacity to buffer fluctuations in determining factors of the surrounding environment (e.g. variations in rainfall, temperature, sedimentation, and others). As a result of these processes, productivity of the system goes up and down within limits around an average level. Such fluctuations can be considered a normal, although, as eco-systems are evolutionary rather than mechanistic, they exhibit a limited degree of predictability (Constanza et al., 1993). Resistance can be measured by the coefficient of variation in productivity (Conway, 1994). This implies that levels of equilibrium, for instance of a pasture eco-system can be defined within certain margins. The average value is not a real equilibrium, but only an empirical mathematical average of observed fluctuations. As all natural processes are characterized by great variation and a certain level of unpredictability, levels of equilibrium can only be defined within certain limits. Although the average value is sometimes referred to as the natural level of equilibrium, a situation of absolute stability is seldom encountered, since there are always fluctuations and gradual changes. Therefore, what are commonly accepted are transition processes and fluctuations around average values.

Under some extreme conditions and use, eco-systems productivity may fall well below the average level and normal fluctuations. If productivity falls, it may recover either to its original level or to a new lower level, or in extreme cases it may cease to exist altogether.

Resilience is the ability of the system to return to a former state, after being affected by major disturbances (Connel and Slatyer, 1977). Connel and Slatyer describe various measures of resilience as:

1. Inertia (level of disturbances or shock that can be resisted without major change);
2. Elasticity (speed of recovery from disturbance);
3. Amplitude (maximum amount of change following disturbance and process of recovery);

4. Hysteresis (difference between process of disturbance and process of recovery); and
5. Malleability (difference between productivity before and after disturbance).

There is a continuum between resistance and resilience: resistance may refer to the dynamics when an eco-system is subject to minor disturbances, and resilience may refer to major disturbances in a highly variable natural conditions or in unexpected situations (e.g. man-made fires). For instance, the bound of variation or resilience levels for forest fires between *Pinus wallichiana* and *Pinus roxburghii* forests will differ. The bound of variation or resilience will determine the collapse of eco-system. So long as the forest fires are not repeated or the pastures are used within the carrying capacity, the eco-system will recover. However, if forest fires occur before the eco-system can recover or the pastures are over-used, the process may push the eco-system beyond the bound of resilience, and therefore, lead to the collapse of the eco-system. The process of destruction of the biomass by forest fires, followed by browsing of the spring vegetation will push the eco-system beyond the bound of variation or resilience. This example can be observed along the Thimphu-Paro highway wherein the eco-system seems to have almost collapsed beyond the capability to support the recovery of any vegetative growth. Cumulative effects of such disturbances (change over time of one of the factors determining eco-system productivity) have led to the gradual (e.g. the gradual increase of grazing pressure or of soil depletion) (Brown, 1994) degradation of the eco-system along the Thimphu-Paro highway.

Although little empirical evidence has been published, it is evident from general observation that cumulative impact of forest fires and grazing are the two main sources of environmental degradation. This can be demonstrated if one observes the difference in quality and quantity of vegetative cover between inside and outside a fenced plantation, particularly on steep slopes and high intensity grazing areas.

The evidence of intensive grazing is obvious as reflected by the criss-cross of trampling marks, in some cases resulting in permanent tracks. Such level of grazing intensity will lead to the process of irreversible environmental degradation whereby the eco-system is incapacitated to support regeneration.

It also shows that the eco-system has been used beyond its carrying capacity. Therefore, grazing frequency, intensity and maintaining the carrying capacity of the eco-system are critical elements of eco-system resiliency. This has been amply revealed by studies carried out in some of the national parks described later.

Environmental degradation, regeneration processes and carrying capacity

Changes in the environmental functions result from pressures on such functions, such as human interventions, natural processes and events, or both. Generally human interventions include exploitation, destruction or disposal of waste materials. The relationship between regeneration processes and pressures determines to what extent such processes lead to degradation of the environmental functions. Therefore, reproduction and regeneration processes influence the capacities to maintain stability, and include regulation processes such as reproduction rates of animals, re-growth and succession of plants, soil formation, purification and decomposition and recharge of water storage. Kessler, et al have recognized basically three degradation processes of environmental functions as:

1. *Depletion.* Taking out (utilizing, exploiting) environmental resources (e.g. plants, nutrients, animals, etc.) in excess of regeneration rates;
2. *Pollution.* Putting in quantities of damaging elements in excess of rate of decomposition, break down and purification processes; and
3. *Disruption and manipulation.* Changing or destroying the natural conditions (e.g. construction of roads, introduction of exotic species or variants by genetic engineering).

It is also generally accepted that there are limits to the resilience of the environmental capacities to provide goods and services. Concepts of environmental utility space and carrying capacity are used to explain this phenomenon. Some examples are the capacity to:

1. Provide a certain amount of nitrogen for plant growth;
2. Produce certain amount of energy;
3. Purify a certain amount of polluted water; and
4. Provide a certain amount of water.

While it is generally believed that grazing has negative impacts on the eco-system, some experience of positive aspects in national parks and protected areas have been discussed.

Studies carried out in the Thrumsingla National Park showed cattle grazing in broadleaf forests tends to alter forest species composition as cattle browse all large tree species except non-palatable species such as *symplocos*, *daphyniphyllum*, rhododendron, litsea and persea. When a large number of cattle graze over a long period, the impact is shown by an increase in weed and unpalatable tree species frequency. Further changes in forest composition may occur with the proliferation of *Laportea* spp., *Viburnum* spp., fern and bamboo by which forests are permanently altered. The study also showed that there is only a limited time for the cattle-preferred species to grow as the area is grazed by cattle in summer and yaks in winter. Effects of grazing is minimal and forests resilience to regenerate increases when cattle population density is low, and grazing is effectively managed and regulated in areas with high cattle density. However, cattle eat so much of palatable biomass that there is very little left for the free-ranging ungulates.

Impacts of disturbance induced by grazing over time depend on the type of eco-system. For instance, human influences on the landscape through the introduction of burning and grazing have probably led to the replacement of relatively

species-poor habitats by more species-rich ones. This was observed in the Jigme Dorji National Park (Laya) wherein *Rhododendron setosum* dominated vegetation, typically supporting only three or four species of herb or grass. Assuming that *R. setosum* dominated vegetation is a relatively natural and largely unmodified eco-type, it appears that after the introduction of grazing, the effect of trampling opens up the ground cover to other species. Under these circumstances, around 30 species were recorded. Similarly, on an adjacent area of *R. setosum*, burned around 15 years ago, 48 species were recorded and there was greater cover by palatable grass species. However, on a very steep slope burned at the same time, the survey team noted less grass cover, more exposed soil and more moss cover together with associated land slippages. Therefore, species richness is often the result of a subtle interplay between management practices and the ecological response of grass and herb species to the changes imposed.

A similar study carried out by Renewable Natural Resource-Research Centre (RNR-RC) in Bumthang, revealed that moderate level of grazing in conifer forest seems to benefit the forests, and activates natural regeneration. However, in broad leaf forests, grazing definitely impacts negatively on natural regeneration.

Socio-economic

The issue of grazing cannot be discussed from ecological or legal point of view only. The role of livestock in the socio-economic structure of the various households and communities has to be examined before putting forth any policy based on “technical fix” approach. There are issues such as “can any meaningful change be facilitated by the government which primarily involves the lifestyle of the rural households and communities”? How can this change, if at all possible, link to other patterns of livelihood amongst the households and communities? What viable/sustainable and acceptable options can be offered for the proposed change? Since the present practice of grazing by the rural people is

considered detrimental to the ecological stability, what type and level of government intervention is considered appropriate and adequate?

The functioning of the socio-economic structure at the micro-community level needed to be analyzed, particularly the traditionally accepted mode of access to and use of pastures based on client-patron relationship.

Livestock rearing is a private sector enterprise sustained initially through some support from the government such as improvement of breed, health care, feed, etc. Otherwise its functioning has little bearing on the government, except some policy decisions impact on its sustainability. It is in this context that discussion on socio-economic issues related to grazing is focused?

Like many agricultural enterprises, livestock rearing is a private undertaking. This may be practiced at individual, household, or community level. This practice has not undergone any major changes in Bhutan as some societies have experienced wherein the state has intervened, and nationalized all livestock and managed as central farms or limit the holding back of benefits from livestock farming. Government has not fixed any upper or lower limits of price of livestock products except for meat to adjust to structural dis-functioning of economics of supply and demand in urban areas. There is also no limit to the size of the herd of the livestock. Furthermore, all rights to pastures have been conferred to individuals, households, communities and institutions by the laws of the county such as the Thrimshung Chhenmo, the Land Act, the Forest and Nature Conservation Act, and other by-laws. It is therefore, to a large extent and under some limitations, a free enterprise. The state comes to picture only when the functioning of the enterprise impacts negatively on the environment, i.e. pastures, as it is considered to be the mandate of the state to protect the environment of the country for larger interest.

While discussing either a pasture management strategy or a national pasture policy, the participation of the livestock owners and pasture/grazing right holders is crucial for any meaningful impact of such decisions. The normally accepted approach of taking many things for granted has to a large extent ground many strategies and policy decisions. When one is dealing with a private enterprise such as livestock it becomes even more imperative to consider the participatory approach to decision-making. However, in the context of Bhutan, the term participation has to be viewed from a realistic perspective. To participate one would also need to negotiate (Wangchuk, S. 1997). And it is at this stage of participation one runs short of negotiating partners. For instance, we have little insight into as to how households that comprise a community are organized, the patron-client relationships, and flow of natural resources and social energy within and outside these communities. The social organizational pattern and capability are other important elements that determine the level of participation in the development of strategies and policies that are assumed to particularly benefit them, and the government to certain extent.

Private property rights regime has been established through legitimacy conferred by the Thrimzhung Chhenmo and various other laws of the country. Grazing rights clearly figure as one of the main rights and concessions conferred upon individuals, households, communities, and institutions by these laws. These rights and concessions are deeply founded and well entrenched in the inheritance mindset of the right holders and will not forfeit or give up such rights under normal circumstances. It may take adequate financial incentives or national interest for the right holders to give up the rights. The concept of *phazhing* and being able to hold on it could also influence decision of the right holders. For instance, if one analyze the reasons for not being able to get the National Pasture Policy even past the government agencies, this can be attributed to a large extent to such reasons. It may have been a difficult proposition for the

pasture/grazing right holders to agree to the nationalization of their pastures without adequate financial compensation, which the government could not afford at such magnitude. For instance, the government approved compensation of Nu 200 per acre of grazing/pasture rights withdrawn by the government. Assuming that at least such rights cover 10% of the country, the compensation amount could run into millions that the government may not be able to pay.

The issue of changing the property rights regime was discussed in the 74th Session of the National Assembly in 1996. This was in relation to sharecropping of agricultural land in Trongsa Dzongkhag. The people's representative of Trongsa had pleaded for transferring the ownership rights to the share-croppers as the share-croppers have to share the crops with the land owner although they have done all the hard work in the field. It was also submitted that the practice of sharecropping discourages sharecroppers to invest in land development such as soil conservation programme, proper maintenance of irrigation, etc. Amendments to the Land Act relating to sharecropping were suggested as:

1. People dependent on share-cropping should be given independent land holdings;
2. All land owners should be made to cultivate their land by themselves and not by others; and
3. If landowners are engaged in business or government service, their land should be sold to the sharecroppers. If the sharecroppers cannot buy the land, such land should be bought by the government and sold to them at subsidized price.

Not a single member of the National Assembly supported the proposal, and in fact it was felt that such a proposal would involve drastic change from the existing provisions of the Land Act. It was argued that the law should not be amended for the benefit of a few individuals. The National Assembly therefore resolved that the proposal does not warrant any discussion and that the sharecroppers should follow the

provisions of the Land Act. The resolution is a reflection of the complexity of property rights and tenure systems, and that sometimes logic (optimal land use policy) does not make much sense.

Another example of such a case can be seen in Laya, a community dependent entirely on livestock rearing. A study carried out by the Jigme Dorji National Park in 2000 in Laya showed a similar trend of land ownership pattern. One of the main findings was a skewed distribution of pastures, the *dratshang* being one of the major owners. Given an option, the local community would like to take over the pastures owned by the *dratshang* and distribute among themselves, depending on the herd size. Although the *dratshang* does not maintain any livestock, past experience shows that this is most unlikely to happen.

Legal Framework and Tenure

The legal framework on the use of and access to pasture is unambiguously laid down in the Thrimzhung Chhenmo, the Land Act of 1978, Forest and Nature Conservation Act of 1995, the Forest and Nature Conservation Rules of 2000 and various resolutions passed by the National Assembly from time to time. Based on the provisions of the laws, technical regulations such as management plans, guidelines, etc. have also been approved by the government. Discussions relating to the legal and tenure aspects of grazing and pasture management have been carried out below.

The Land Act of 1978

Ownership of Grazing Rights

The Land Act 1978 recognizes the right to hold grazing rights by individuals, households, communities, and the *dratshang*.

The chapter on Use of Grazing Rights/Pastures states:

Section Ka 8 “An owner of a registered grazing land in Thram can be issued a permit to use enough pasture of his choice

for his cattle out of his own grazing land. If a person has surplus grazing land after grazing his cattle or a person has no cattle but uses his registered pastures for grazing of other's cattle on payment then it can be taken over and permit for grazing can be issued to the traditional users. In the absence of any previous user, permit for grazing will be issued to the owners of the cattle in villages in the vicinity of the grazing land. Priority of grazing will be that of those nearest to the grazing land, nobody is permitted to graze the lands wherever they like." Further under section Ka 8.6 says "Owners of grazing land having no cattle cannot let out their pastures" and that "A person or a member of a family without having cattle is allowed to maintain the grazing land registered in his Thram. However, people who own cattle but not enough pasture can use the grazing land and water after obtaining permit from the government. The Thram holder can neither let out his grazing land nor graze others cattle pretending to be belonging to him."

Ownership of grazing rights cannot be withdrawn even if the right holder does not possess any cattle. Section 8.7 of Chapter VIII protects his rights as "Rights of ownership of grazing land - If an owner of grazing land has lost all his cattle and later on buys cattle and needs the grazing land then he has full right over the grazing land registered in his Thram as per Ka 8.4"

The Act has recognized the nomadic life style of the nomads (*Dropa*) and provides a clause under Section Ka 8.8 as "Use of grazing land by nomads who have no cultivable land - nomads who has neither cultivable land anywhere nor cattle and is entirely dependent on the grazing land as his livelihood, can let out his grazing land on *Tsarin Churin*. However, the owner must get a permit from the Dzongdag/Dungkhag of the area and give it to the person who wants to graze his cattle. *Dropa* who have grazing land but very few cattle and no cultivable land can also let out their balance of grazing area on *Tsarin Churin*."

The use of grazing rights/pastures owned by goendey have also been explained in the Land Act under Section Ka 8.9 “Use of pasture land belonging to *goendey* -Grazing land registered in the main *Thram* in the name of *lhakhang*, *goendey* and *theptsa yojay* etc. can be grazed without permit. However, if such land is registered in the name of individual persons instead of *lhakhang*, *goenkhang*, *theptsa yojay* etc. then action should be taken according to rules. Likewise for the use of grazing land belonging to *goendey*, *dratshang*, *rabdey*, royal family etc., permit will have to be obtained as per rules.”

People can use unregistered grazing land under Section Ka 8.10 but will be guided by Ka 6.14 even if one posses a *kasho*. The Section further states “If a family is using a grazing land which is not registered in the *Thram* but has a *kasho* in their possession, then the right of ownership will be guided by Ka 6.14. (Sl. No.3 of the 46th Tshogdu, 1977).”

All land including pastures have to be registered within 360 days, and as per Section Ka.6.14 “Allotted land not registered in the *thram* within 360 days shall be treated as Government land” This also includes “Land inherited, purchased, allotted through *kasho*, received as gift, new allotment by Government etc. if not registered in the main *Thram* within 360 days from the day of acquisition will be treated as Government land and the owner will not have any claim on it.”

The Forest and Nature Conservation Act 1995

The Forest and Nature Conservation Act 1995 has also provided a section on grazing. Chapter VI of the Act has a provision on the establishment of protected areas that have implications on grazing in parks and protected areas. Section 21 (a) states “The Royal Government may declare any land in the country to be a National Park, Wildlife Sanctuary, Wildlife Reserve, Strict Nature Reserve, Protected Forest, Research Forest, Conservation Area, Cultural or Natural Heritage Site, Biosphere Reserve, Critical Watershed or other category of Protected Area for the preservation of national importance, protection of biological diversity, management of wildlife,

conservation of soil and water and related purposes. If any private registered land is taken under this section, compensation or alternative land rights shall be provided in accordance with section 9.” Chapter VII Section 30 (a) states “The Ministry (Agriculture) may issue rules regulating grazing in Government Reserved Forests, subject to such conditions as may be prescribed.” And Section 30 (b) states “ Where the head of the department determines that the land located in Government reserved forests is suffering from soil erosion or other environmental degradation, he may, after consulting with the appropriate local authority, order that grazing on such land be stopped for specified time or be permitted only under specified conditions” and Section 30 (c) “Cattle trespassing in a Reserved Forest which has been lawfully closed to grazing shall be deemed to be doing damage to plantations, regeneration and catchment areas and may be seized and a suitable fine as prescribed by the Ministry will be levied.” Further Section 21 (c) states “The Ministry may issue rules to regulate or prohibit any activity within a Protected Area.”

In accordance with the authority vested by the Act, the Ministry of Agriculture has framed rules on the implementation of the provisions (the Forest and Nature Conservation Rules of 2000 Vol. I). And rules relating to grazing states as under Section 62 (2) “grazing permits within the Protected Areas may be issued only for traditional grazers, who must, comply with all regulations under Chapter VIII of this Rule”. Chapter VIII of the Rule states as “ These Rules observe the following under the purview of section 30(a) of the Act.

Grazing in Government Reserved Forest

Cattle grazing in the government-reserved forest may be allowed as long as the following regulations are complied:

- a) The department as per section 30(a) of the Act can stop the grazing in specified location for a specified period;
- b) Grazing is restricted in an area which is fenced for natural regeneration or in a plantation area with or

- without fencing in a given period or till the seedlings are well established;
- c) The Department, if required under this chapter, shall issue orders to effect the grazing in the forest on rotational basis at any time as per the plans prescribed under chapter II of these Rules; and
 - d) Cattle trespassing in the Government Reserved Forest shall be treated as per Section 30(c) of the Act. However, this chapter shall not affect the existing path *tsalam* and *chulam*, traditionally used during the migrating season provided such paths are within the fencing established by the government.

The department may impose ban on grazing in a registered *tsamdrog* whether located within or outside government reserved forest for a specified period if there is a good reason to believe that such steps are required to safeguard the land from degeneration.

The Rules have prescribed penalties for violation of rules including grazing as under:

Section 84 Sub-section 6 (g) states “for grazing livestock within a Core Zone, except by traditional grazers with proper permission under Chapter VII (and such other provisions that may apply), a penalty of Nu 500.”

Section 84. Sub-section 8 (f) states “for grazing in the restricted areas, a fine of not more than Nu 500 or compensation equivalent to Nu 50 per livestock head.”

Technical Regulations

As per the authority conferred by the Forest and Nature Conservation Act 1995, technical regulations on the use of natural resources including pastures have been framed as under.

Grazing Management in National Parks and Protected Areas

Activity	Core Zone	Multiple-Use Zone (Within Park Boundary)	Buffer Zone (Outside Park Boundary)
Construction (Including Roads, Fences, Any Physical Structures)	No	With Permit	Yes
Industry	No	Cottage	As Per EIA Report
Settlement or Cultivation	No	Yes, But Only For Residents	Yes
Commercial Logging	No	No	Based on Approved Management Plan and EIA
Non-commercial Logging	No	Yes, For Use by the Residents	Yes
Grazing	No, Except for Traditional Users With Permission From the Park	Yes, With Permit	Yes
Migration of Cattle	Yes for Passage	Yes	Yes
Pasture Improvement	No	Yes	Yes
Collection of Dry Firewood	No	Yes, For Use by the Residents	Yes
Collection of Green Firewood	No	Yes, For Use by the Residents With a Permit	Yes with a Permit
Camping and Visitors	No	Yes With A Permit	Yes
Research	Yes	Yes	Yes
Taking of Wildlife	No	Yes With A Permit	Yes with a Permit
Extraction of Soil, Sand, Stones	No	Yes Within 2 Km Radius of Domestic User's Residence	Yes, Within 2 Km Radius of Domestic User's Residence
Extraction of Non-Timber Products	No	Yes, For Domestic Use/Consumption	Yes, For Domestic Use/Consumption

Core Zone shall mean fully protected zone within a Protected Area, designated in accordance with Technical Regulations in which human related activities are not permitted, except for regulated research and monitoring programs.

Protected Area shall mean an area, which has been declared to be a national park, conservation area, wildlife reserve, nature reserve, strict nature reserve, research forest, critical watershed or other protected areas in accordance with the Act and Rules.

For example, the Jigme Dorji National Park (JDNP) has used the technical regulations approved by the government to protect the core zone of takin habitat. In Tsharjathang, the park management and the local yak herders have agreed to demarcate the takin grazing area from that of the yaks. While the Thrimzhung Chhenmo and the Land Act ensure that the rules of the law are respected, and that individuals' rights over property are protected, the Forest and Nature Conservation Act 1995 focuses to maintain the ecological integrity of the country. Therefore, the two Acts differ both in focus and spirit.

Grazing/pasture Management Policy for National Parks and Protected Areas

Since grazing involves use of a renewable natural resource, it is imperative to have a good knowledge of the processes involved in maintaining the eco-system productivity of this renewable natural resource. Many studies have been carried out in other countries on the eco-system management and ecological stability, and limited studies carried out in Bhutan. It is important to have a clear understanding of the impact of various human interventions, and the expected response of the eco-system to such interventions. Policy decision on the level and intensity of the use of the pastures should therefore be based on the scientific knowledge on the ecological processes – its ability to recover or its resilience, cost of restoration and enhancement, etc.

A living eco-system is a dynamic system that can take certain amount of stress. Therefore, pastures in the national parks and protected areas should not close up the entire area for grazing. The level and extent should, therefore, be based on the resilience of the particular area. The guidelines of the management plan may be a useful source of direction and scope.

The social structure and the patron-client relationship are important elements to decide the use of and access to pastures in the communities. Regulations originating from the state on any resource use involving community are rarely effective. Grazing/pasture policy will need to look deeper into such social arrangements, and not rely entirely on logical sequence and productivity of a particular natural resource.

Pasture is a private property conferred on the right holders by the Thrimzhung Chhenmo, the Land Act, the Forest Act of 1978 and the Nature Conservation Act of 1995. Any intervention by the state in the rearrangement of the private property (pasture) will entail careful planning and active participation by the right holders. Such need was amply reflected by the response of the landowners when the issue of sharecropping was discussed in the National Assembly. Therefore, it becomes imperative to address the tenure aspects, and involve the pasture/grazing right holders before taking any major policy decision, particularly if it involves a shift in property rights regime.

Bibliography

1. Bromley, Daniel W. (1991). *Environment and Economy: Property Rights and Public Policy*, Blackwell: Oxford.
2. Burch, William R. and Donald DeLuca (1984). *Measuring the Social Impact of Natural Resource Policies*, Albuquerque: University of New Mexico Press
3. Ministry of Agriculture (1995). *Forest and Nature Conservation Act 1995*, Thimphu: RGOB
4. Ministry of Agriculture (NA.). *Forest and Nature Conservation Rules 2000 (Vol. I & II)*, Thimphu: RGOB

5. Nature Conservation Section, FSD, Ministry of Agriculture (N.A.). *Jigme Dorji National Park Management Plan, 1995-2001*, Thimphu: RGOB
6. Jigme Dorji National Park (2000). *Integrated Conservation and Development Plan – A Pilot Project in Laya Gewog, Gasa Dzongkhag*, Thimphu: RGOB
7. Golley, F.B. (1983). *Eco-systems of the World – Tropical Rain Forest Eco-systems: Structure and Function*
8. Gyamtsho, Pema (1996). *Assessment of the Condition and Potential for Improvement of High Altitude Rangelands of Bhutan*. Doctoral Thesis, Zurich: Swiss Federal Institute of Technology
9. Jodha, N.S. (1986). “Common Property Resources and Rural Poor in Dry Regions of India”, *Economic and Political Weekly*
10. Kaul, Minoti Chakravarty (1992). “Forest Rights and Forest Laws in the Indian Himalayas during the Second Half of the 19th Century”, *Schmithusen, Forest Law and Environmental Legislation*
11. Kessler, Jan Joost (N.A.) *Theoretical Background to Strategic Environmental Analysis*, SNV
12. Survey of Bhutan (N.A.). *Land Act 1979*, Thimphu: RGOB
13. Miller, Daniel. (1995). *Herds on the Move: Winds of Change among pastoralists in the Himalayas and the Tibetan Plateau*. Katmandu: ICIMOD
14. National Assembly, RGOB (1996). *Proceedings and Resolutions of the 74th Session of the National Assembly*
15. Rosset, J. (1999). “Temperate Conifer Forests of Bhutan: A review of forestry research activities until June 1998”, in RNR-RC Jakar, Special Publication No. 3, 1999
16. Schmithusen, Franz and Spinnler Martin (1996). *Bibliography of Forest Legislation, Forest Tenures and Joint Utilization Systems on Public Land*
17. Schmithusen, Franz (1996). *Experiences with Public Forest Ownership and Joint Management Systems – Proceedings of IUFRO Forestry Conference Pushkino, Moscow, June 1994*
18. Wathern, Peter (1992). *Environmental Impact Assessment – Theory and Practice*
19. Wangchuk, S. (2001). *River Eco-systems in Bhutan: Background Paper for Preparation of Environmental Action Plan*, Thimphu: National Environmental Commission
20. Wangchuk, S. (1998). *Local Perceptions and Indigenous Institutions as Forms of Social Performance for Sustainable Forest Management in Bhutan*. Swiss Federal Institute of Technology: Forstwissenschaftliche Beitrage 20

21. Wangchuk, R.T. (1999). *Diet Selection by Bhutan Takin Budorcas taxicolor white on Summer Range in Jigme Dorji National Park, Bhutan*, Master of Science, Thesis, Agriculture University of Norway
22. Yonzon, Pralad (2000). *Status of Wildlife Conservation, Thrumshingla National Park*, Thimphu: Nature Conservation Division, DFS, MOA