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# Institutional responses to development pressures: Resilience of social–ecological systems in Himachal Pradesh, India

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## SUMMARY

In the Kullu District, Himachal Pradesh, India, economic and urban growth, and diversification have increased pressure on forests and forest-based social–ecological systems. As in many Himalayan regions, livelihood sustainability is linked to forest resources, products and services. Recent development in the region, to which these systems may be vulnerable, brings into question environmental and livelihood sustainability. This paper examines the resilience of integrated systems of people and nature, or social–ecological systems, in the face of development pressures by evaluating a number of local and state-level institutional responses. Resilience, which describes the ability of the social–ecological systems to adapt to change by buffering shocks, improving self-organization and increasing capacity for learning, is an essential quality for sustainable development. Institutional responses which positively contribute to resilience and sustainability include the work of *mahila mandals* in forest management, adoption of Joint Forest Management (JFM) policies and practices, upholding rules, strengthening local institutions, establishing firewood depots and adopting alternative energy sources. Institutional failures brought about by the lack of rule enforcement and corruption erode resilience. The analysis of institutional responses helps to identify areas where capacity exists and areas in which capacity building is needed to produce resilient social–ecological systems and therefore, sustainable development.

## INTRODUCTION

In the Kullu District of Himachal Pradesh (Figure 1) in the Indian Himalaya, forests form an integral part of the village-centric system of land use and management (Berkes *et al.* 1998, 2000; Duffield *et al.* 1998). Links between forest resources, products and services and the agricultural systems have been essential for livelihood sustainability in this (Sinclair and Ham 2000) and other areas of the Himalaya (Moench 1989) for generations. Throughout the British colonial period, beginning in Kullu in the mid-nineteenth century, and even more so following Indian Independence in 1947, numerous external factors have influenced the traditional social–ecological systems and their resource bases in the region. Among these factors are the India Forest Act of 1878 and the resulting redefinition of property and resource use rights, tourism, growth of urban settlements, commercial agriculture and horticulture, as well as land redistribution and

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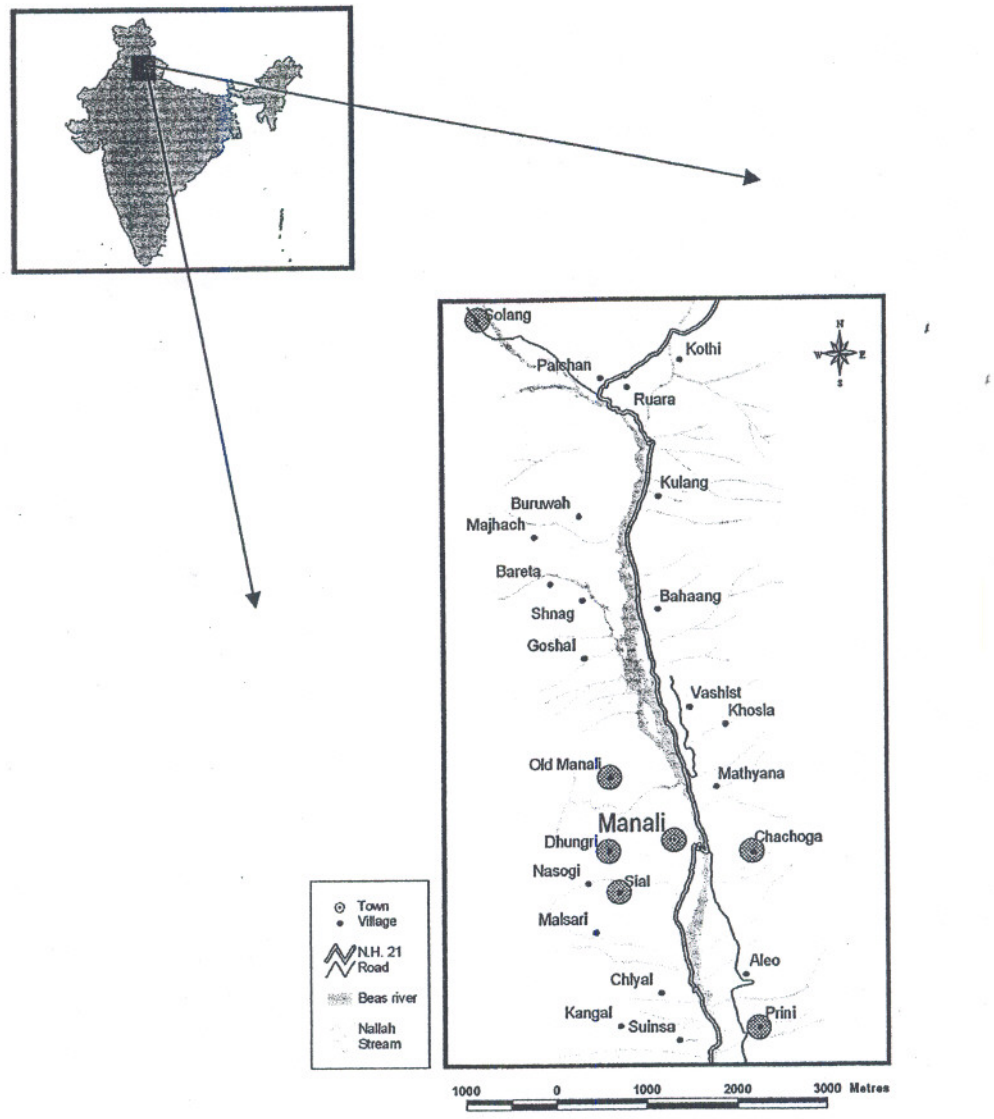


**Figure 1** Map of the Manali area, Kullu Valley, Himachal Pradesh, India. Villages where interviews took place are indicated by filled circles

geopolitical conflict (ODA 1994; Sandhu 1996; Berkes *et al.* 2000, Gardner *et al.* 2002).

This paper examines the resilience of the forest-based social–ecological systems in the vicinity of Manali, a rapidly expanding and diversifying community in the northern part of the Kullu District (Figure 1). A high level of resilience would allow these systems to adapt to and buffer forces of change in a way that will ensure their long-term sustainability. Forests are a fundamental component of the Kullu District social–ecological systems and therefore we focus on those pressures that most directly affect the forests and evaluate the local and state-level institutions that are involved in their use and management. The institutions are evaluated for their contributions to the resiliency of the social–ecological systems, livelihood sustainability and long-term sustainable development.

The Kullu District is a high mountain area on the south slope of the Himalaya. Elevations range from 1000 m to over 6000 m above sea level and the area is highly biodiverse, reflecting the altitudinally variable moisture and energy regimes. The Kullu Valley, which is approximately 90 km in length and forms the upper reaches of

the Beas River, is the principal historical focus of settlement and land use and is the area that has experienced the greatest pressure on forest and other resources. The valley is relatively wide at its base (up to 2 km), being made up of the floodplain of the Beas River and gently sloping paraglacial fans and terraces (Owen *et al.* 1995) and giving rise to the rich 'agricultural plateaux' described by Harcourt (1871).

About 40% of the Kullu District is presently forest-covered (ODA, 1994). The forested area is composed of montane coniferous forest, with deodar and fir species dominating at lower elevations. Temperate mixed deciduous and coniferous forest, deciduous forest of birch and some oak, and a forest–tundra ecotone of mixed trees and tundra or meadow vegetation are found at progressively higher elevations. Centuries of agricultural and other land uses have left their imprint on the landscape and the present vegetation cover, all of which is highly managed in the integrated social ecological system (Berkes *et al.* 1997). Historical changes in the forest cover of the Kullu District present a mixed picture, leading to neither complete deforestation as suggested for some areas of the Himalaya (Eckholm 1975) nor being left unaltered. Forests in the lower reaches of the Kullu Valley, south of Kullu town, were severely depleted in the pre- or early colonial periods prior to 1860. The upper reaches of the Kullu Valley and much of the rest of the Kullu District has not undergone deforestation of any significance in the past 150 years (Gardner 2002). In part, this was the result of some sensitivity to customary village forest use practices in the Kullu District during the drafting of the forest settlements under the India Forest Act in the late nineteenth century (ODA, 1994).

## Resilience and sustainable development

Central to this paper is the idea that resilience of social–ecological systems contributes to their long-term sustainability and sustainable development. Folke and Berkes (1998) refer to social–ecological systems as open systems, subject to influences such as population growth, trade and forces of globalization, technology and political instability. Resilience, or the capacity of a system to buffer and survive disturbance, is a framework for understanding how a society can sustain itself in times of social, political, economic and environmental transformation (Berkes *et al.* 2003). Thus, resilience (Holling 1995; Folke and Berkes 1998; Gunderson and Holling 2002) is a key concept through which to examine the sustainability of forest-based social–ecological systems in the Manali area of Himachal Pradesh. There are three defining characteristics associated with the concept of resilience (Resilience Alliance 2003): the amount of change a system can undergo and still retain the same controls on functions and structures, the degree to which the system is capable of self-organization, and the ability to build and increase capacity for learning and adaptation. Sustainability, meanwhile, refers to living within ecological means (Holling *et al.* 1998), and management for resilience enhances the likelihood of sustainability in environments where there is uncertainty. More resilient social–ecological systems are able to absorb environmental, social or political and economic perturbations without changing in fundamental ways. Policies, practices and institutions that build or enhance resilience help systems to cope with surprises by increasing capacity to renew and reorganize following change. These same institutions can also help to maintain or add to the diversity of economic options when the system is not under pressure (Folke *et al.* 2002).

Institutions within social–ecological systems may be considered as vehicles through which resilience can be enhanced or compromised, and therefore they may or may not contribute to sustainability and sustainable development. Institutions are described by North (1994) as 'humanly devised constraints that structure human interaction. They are made up of formal constraints (rules, laws, constitutions), informal constraints (norms of behavior, conventions and self-imposed codes of conduct), and their enforcement characteristics'. Institutions are dynamic or fluid through time and a description of an institution is therefore very time and context specific. By applying the concept of resilience, it is possible to move beyond static institutional forms and focus on institutional dynamics by examining how social groups and their institutions behave in the face of social, political, economic and environmental/ecological change (Berkes 2002).

The purpose of this paper is to assess institutional responses to development pressures as to whether and how they affect the buffering capacity of the forest social–ecological systems by providing resilience. The pressures and associated problems of the forest social–ecological systems provide the context for discussion of institutional responses. Through the outline of institutional responses, some of the more direct effects of resilience emerge and are discussed in relation to the three characteristics of resilient systems. This provides the basis for evaluating outcomes of institutional responses in terms of resilience, and also in terms of the sustainability of the forest social–ecological system.

## METHODS

The research methods employed in this research included semi-structured interviews, participant observation, and some direct participation. Research efforts were concentrated in the villages of Old Manali, Prini, and Solang, as well as in the town of Manali itself (Figure 1). An initial interview process involving interviews with representatives from the *mahila mandals* of 29 villages provided an overview of forest management issues in the area, which helped in selecting villages where research efforts would be concentrated.

Villages were selected on the basis of geography and accessibility relative to Manali. The existence of a Joint Forest Management project within the village was also a factor considered in the selection process. The objective was to capture perspectives from locations that had been more or less influenced by the changes that have taken place in the town of Manali. Interviews also took place in the nearby villages of Sial, Dhungri, and Chachoga (Figure 1), in order to triangulate information and add depth. Forest Department officials were interviewed on several occasions throughout the fieldwork.

The experiences of a previous research team in the area facilitated this research project by building a research base and establishing valuable local contacts (Berkes *et al.* 2000). One key contact was the translator, a young man from a village that was the focus of initial research during the field season of 1994. Excerpts from interviews throughout this paper are therefore not verbatim quotations from villagers. They have been subject to interpretation by a translator and by the interviewer while being recorded in a field notebook, but they do reflect the sentiments of the people interviewed as accurately as possible.

## BACKGROUND

### Pressures on the forest social–ecological system

It is relevant to briefly outline the pressures on the forest social–ecological system in the Manali area, as it is these pressures that are evoking institutional responses. Table 1 summarizes pressures on the forest social–ecological system, focussing on villages that are case studies or, due to proximity to the urban area, are being encroached on by the growth of Manali. The peri-urban villages of Dhungri, Sial and Chachoga face nearly identical issues and thus are aggregated in Table 1.

Some pressures described in Table 1 require explanation. 'Smuggling' is a term used by local people to describe the covert (and illegal) practice of cutting trees at night or otherwise surreptitiously and delivering the timber to hotel builders for construction purposes. According to local people, 'smuggling' has been and is carried out by local people and to a lesser degree by outsiders.

The Timber Distribution system, commonly referred to as the TD system, is the process by which rightholders (those holding land) claim rights to timber, primarily to meet construction needs. The Forest Corporation is the entity contracted by the Forest Department that clears out dead, uprooted, or dried out trees in designated areas, providing the supply for various fuelwood and timber depots in the area.

The similarities across villages in proximity to Manali, and therefore more physically accessible to the source of timber demands, enables some generalizations to be made in terms of institutional responses.

### What is forest area and what drives forest management?

There are differences in perception in terms of

**Table 1** Pressures on the forest social–ecological system in the Manali area

| *Village/Area* | *Pressures* |
|---|---|
| Manali | Demands for timber to supply the construction boom – creation and growth in black market for timber; increasing demands for fuelwood by growing urban population; |
| Prini | Illegal felling and sale 'smuggling' of trees; forest depletion by sale of fuelwood in urban area; dissatisfaction with inequities associated with the Timber Distribution system; pressure due to construction needs; population growth |
| Solang | Alleged corruption involved with forest corporation contracts; pressure due to construction needs; population growth |
| Old Manali | Proximity to urban area – accessible to outsiders, road access; illegal felling and sale/'smuggling' of trees; forest depletion by sale of fuelwood in urban area; dissatisfaction with inequities associated with the Timber Distribution system; pressure due to construction needs; population growth |
| Dhungri, Sial, Chachoga | Proximity to urban area accessible to populations of outsiders; non-rightholders (from Manali) using forest areas; illegal felling and sale/'smuggling' of trees; forest depletion by sale of fuelwood in urban area; pressure due to construction needs; population growth |

what one is talking about when referring to 'forest area'. 'By forest, according to custom, is meant all unenclosed land more or less covered with wild-growing trees and bushes' (Lyall 1876). Chhatre (2000) asserts that Lyall's description of popular perception of forests in the 1860s would still hold true for most of Kangra, if not all of Himachal Pradesh. Forests are locally perceived to be everything (objects as well as functions) contained within an area that has trees and bushes; people even talk about the forests as places where there are not any trees (e.g. some pasture areas are in the 'forest'). This description is vastly different from the perception of 'forest areas' as those with trees; trees being the primary preoccupation of the Forest Department, both in the past and in the present context (Saberwal 1999; Chhatre 2000).

As Chhatre (2000: p. 24) notes, the Forest Department 'has tried its best to rescue forest areas from being "covered with wild-growing trees and bushes" by substituting "useful" trees'. This difference is important because it lies at the heart of most of the conflicts that have come to characterize the relationship between local people and the Forest Department. Chhatre (2000: p. 26) takes this idea even further when he states that '[t]he fact that livelihood activities are being met at all is a mere accident as the management objectives of the Forest Department have never encompassed bulk-use subsistence requirements of local communities, beyond their recognition as rights to be suffered'. Whether the context is access by rightholders to timber through the Timber Distribution system overseen by the Forest Department or the implementation of new initiatives such as Joint Forest Management (JFM), differences in perception rooted in how each party values and describes the forest colours the relationship between local people and the Forest Department.

To situate this discussion in a broader setting, it is also important to briefly explain the backdrop against which forest management takes place in the Manali area. Under the Forest Settlement of 1886 in the Kullu District, the majority of forests were designated Protected Forests, as opposed to Reserved Forests (ODA, 1994). This meant that local people retained their usufruct rights to forest products such as fuelwood, fodder for livestock, coniferous needles and other non-timber forest products. The acknowledgement of local people's usufruct rights under the Forest Settlement also meant that these rights were recorded and formalized (Davidson-Hunt 1997). The Kullu District Forest Settlement was unusual in comparison to other regions where most forest areas were designated as Reserved forests, which in many cases resulted in the termination or severe restriction of local peoples' rights (ODA 1994). The strengthening and formalization of rights in the Kullu District may have assisted in the maintenance of well-defined village forest use areas.

The *de facto* village use areas, however, are often very different from the area defined by the Forest Department as the forest use area of a particular village. Specific and widely recognized arrangements amongst villages also exist such that one village has permission to use the forest areas that 'belong' to other villages. The Forest Settlement in the Kullu District also may have had other implications; there has been speculation that the persistence of local management institutions may be due in part to the clear definition of local rights under the Forest Settlement (Davidson-Hunt 1997).

## RESULTS AND DISCUSSION

### Institutional responses

Both village and state-level institutions contribute to the management of village forest use areas in the Manali region. The purpose of this discussion and analysis is to examine how institutional responses affect the capacity to buffer the forest social–ecological system from development pressures, thereby commenting on forest social–ecological system resilience. The institutional responses discussed in the following pages include responses by the state Forest Department (including the adoption and implementation of Joint Forest Management), the village *mahila mandals*, and the informal rules-in-use at the village level. The institutional responses examined are not an exhaustive list of ways that the social groups and their institutions in the Manali area have responded to pressures on the forests. The responses included in this analysis are a reflection of the research process and are the responses that became most readily apparent or were observed during the course of research. The range of institutional responses reflects the reality of the involvement of both government and non-government entities in forest management, the levels at which institutions function (state, local), and the fact that both formal and informal institutions contribute to the management of the forests.

### The Manali fuelwood depot

A depot to provide timber and fuelwood was established by the Forest Department in Manali approximately ten years ago. The depot was a response to increasing demands for fuelwood and timber by a growing urban population (perhaps partially due to banning the use of local timber for producing apple crates, which used to create 'wastewood' that was used for fuelwood), and a growing cash economy that made purchasing fuelwood feasible for a growing number of people. The depot provided an alternative source of fuelwood, which had several implications. Availability of fuelwood from the depot contributed to the decrease in demand for fuelwood brought into Manali for sale by villagers and thus was an economic disincentive to villagers who were involved in this practice. It was suggested that the depot prices were better. One villager stated,

> Villagers were just bringing small bundles for Rs. 80 and the depot was cheaper.
>
> (Manali, Sept. 17/99)

Comments from interviews supported this idea; one woman admitted that she used to sell fuelwood in Manali. She indicated that she stopped doing so because it made better economic sense to pursue other income-generating activities. Indirectly, the existence of the depot also helped to support the efforts of the *mahila mandals* of the area who had tried to ban the sale of fuelwood by villagers in Manali. In terms of meeting some of the demand for construction timber, however, the depot was ineffective because timber prices at the depot were exorbitant in comparison with black market prices.

### Strengthening the timber distribution system

The Forest Department in Himachal Pradesh does not permit the felling of trees without its approval. Villagers who are rightholders (who have a right to timber for the purpose of house building or repair, known as a Timber Distribution or TD right) must make an application to the Range Forest Officer of the State Forest Department and prove need in order to have a tree allocated to them. 'Strengthening' the TD system under which timber is allocated to village rightholders for construction or repair of houses on one level is a measure with positive implications for the health of forests. The Forest

Department has imposed further limitations on the amount of timber to which each villager is entitled over the past decades and the requirements to demonstrate need have become more stringent. Villagers in Prini and Old Manali indicate that they are no longer permitted to simply remove a broken or fallen tree in the forest; instead, all timber must be allocated through the TD system,

> Twenty years ago if a tree was broken or fallen, no permission was required to take it; it used to be that making a mark on the tree indicated that it had been claimed. Now the Forest Department takes that tree and gives it to someone else as TD timber. This creates problems.
>
> (Prini, Sept. 12/99)

The difficulties with the increase in regulation are twofold. First, strengthening the TD system reinforces responsibility for management and decision-making power as the domain of the Forest Department, further alienating responsibility for management or monitoring from local villagers. Second, strengthening the TD system places further emphasis on formal aspects of the process such as filing forms and pleading cases to Forest Department officials. This makes the application process more accessible to some people than others and makes it vulnerable to corruption. Many people voiced concern in this regard,

> TD rights are being misused. If someone is uneducated, another can apply for TD entitlements in his name.
>
> (Old Manali, Oct. 27/99)

> The Forest Department gives some people trees and yet others are not even allowed the dry and broken ones. They take money from the rich and allocate trees but poor people's requests are always scrutinized closely.
>
> (Old Manali, Oct. 26/99)

## Adopting Joint Forest Management as a policy

The adoption of Joint Forest Management (JFM) in Himachal Pradesh is linked to the nation-wide shift in the approach to forest management, pioneered in West Bengal and directed by a national policy instruction (Government of India 1990). Almost all states in India have followed the lead of the national policy and adopted JFM resolutions of their own. JFM is a programme applied to degraded forest areas so the situation in the Manali area, which has heightened pressure on forest areas, makes JFM applicable in this context. The adoption of JFM in the Manali area is an institutional response to the illegal felling of trees and to an inability on the part of the Forest Department to control the illegal activities. The principles of JFM represent a fundamental shift for the Forest Department from a top-down approach towards a more participatory approach to the management of the forest.

In theory, this is a progressive institutional response and it has the potential to move in the direction of formally re-establishing greater local responsibility for the care, protection and management of village-use areas. Through the creation of village level committees, local people are encouraged to participate in the management of their forest areas. These committees have been mandated by the Forest Department to set the terms and rules that dictate villagers' relationship with the forest (Government of Himachal Pradesh 1993).

More importantly, JFM may be viewed as an opportunity for the building of trust between local people and the Forest Department to be reestablished or reinforced. This is significant to system resilience according to Adger (2000) who emphasizes social capital, the inclusivity of the institution, and the degree of development of trust among the parties in analyzing the resilience of institutions. Villagers express mistrust and the approach of the Forest Department has been described as one where they were simply 'giving orders'. Alleged corruption related to the Timber Distribution system and the supervision of Forest Corporation contracts for the removal of dead trees has further added to villagers' wariness with respect to the Forest Department. From this perspective, JFM represents an opportunity to begin to restore faith in the Forest Department as an organization with credibility from local people's perspectives.

## Implementation of JFM

JFM is an institutional policy response on the part of the Forest Department to perceived pressures

on the forest. However, the way in which the policy is being implemented will be discussed separately from the adoption of JFM because there are different implications associated with each response in relation to the resilience of the forest social–ecological system. JFM is intended to promote participatory forest management involving local people. Manifestations of JFM at the village level take the form of Village Forest Development Committees (VFDC), which are a new institutional phenomenon in the Kullu District and even more so in the Manali area (interview with the Range Forest Officer, Manali). The comments that follow with regards to the implementation of JFM are based on interviews in Prini and Solang – two of the villages that were the focus for field studies – where JFM initiatives are underway.

The structure of VFDCs and representation on these committees is prescribed by the state policy resolution, and in this sense JFM imposes institutions. There are difficulties associated with this imposition. Two considerations emphasized by Lele (1998) relate to underlying empirical assumptions of JFM: that the pre-JFM property rights regime is either one of full state control or open access, so that there is a 'blank slate' on which the new regime may be written, and that the 'community' exists as a cohesive body. In accordance with Lele's (1998) analysis, neither of these assumptions holds true in the villages in the Manali area (Berkes *et al.*, 2000) because village-level institutions regarding forest management have persisted despite *de jure* state control of forest areas, and 'communities' in the Manali area are not comprised of socially or economically homogeneous units. Sensitivity to local context and adaptation of JFM as required could result in village level institutions that are able to respond positively to externally imposed institutional structures, however this is not occurring to date.

The diversity of livelihood, social and economic positions, and cultural subtleties is not being recognized and accommodated by the current structuring of JFM. The policy makes provision for women and the 'poor' through membership requirements (Government of Himachal Pradesh 1993); however, Sarin (1997) points out that when representation is prescribed, particularly through minimum requirements, the minimum often becomes the maximum. More troubling is evidence that these requirements are being ignored or circumvented. For instance, in Prini, the Executive body has no female members, and in Solang, women whose names were on the list of Executive body members had no knowledge that they were on the committee.

Although JFM holds the potential to encourage local management responsibility in that VFDCs are mandated to design operational rules, there are several issues that minimize this power and potential responsibility. As many authors have pointed out, the Forest Department retains control over the entire process; village institutions do not have any real legal status or formal authority, and the policy instruction can be withdrawn at any time (Chhatre 2000; Ghate 2000; Lele 2000). VFDCs perform the same function as Forest Department staff; however the committees cannot even claim this degree of authority (Saigal, 2000). Further, VFDCs do not have autonomy over functioning – the Divisional Forest Officer has the power to dissolve a committee if he feels it is not functioning properly. Finally, even the power that the VFDC does have in the creation of operational rules is subject to the approval of the Divisional Forest Officer.

## The activities of the *mahila mandals*

The *mahila mandal* or village women's organization, is an all-woman forum that exists at the village level throughout India. The concept of the *mahila mandal* was developed at the level of the central government (Ham 1995; Davidson-Hunt 1995), and as such it is an institutional structure that has been imposed on communities. However, the flexibility in terms of the purpose and objectives of *mahila mandals* has meant that in some cases it has been adapted to the local needs of the village. In the Manali area, the average length of time that the *mahila mandal* had been in existence in a village was nine years. In one of the 29 villages surveyed, the *mahila mandal* had been in existence since 1977. Almost all *mahila mandals* of the 29 villages surveyed in the summer of 1999 indicated that they were active to some degree in forest protection.

The responses by *mahila mandals* in the area to pressures on the forest social–ecological system stem directly from depletion of localized areas

of the forest, and indirectly from the economic changes driving the activities that have resulted in depletion. The responses of the *mahila mandals* function to promote the protection of their forest areas. Ham (1995) and Davidson-Hunt (1995) established that the *mahila mandals* in the Manali area have reacted by monitoring the extraction of timber from the forest areas through patrols and confiscation of illegal timber, by instituting and attempting to enforce a ban on the sale of fuelwood outside the village, and by discouraging the practice of lopping branches. In addition, *mahila mandals* also began to exclude women from collecting fuelwood in their forests unless they had rights to do so, which had affected women from Manali town who did not have rights to collect fuelwood in any forest. As one *mahila mandal* member recounted,

> People from the bazaar [town] used to come here to collect fuelwood, it was allowed. When the *mahila mandal* became established, we stopped them from coming because there was less and less fuelwood available.
>
> (Dhungri, Oct. 17/99)

As noted previously, the right to collect and use forest products from specific forest areas is a right derived from the customary system of access and use that preceded the British colonial system and survived the formalization of tenure under that system. The informal system currently practiced is fluid and often differs from what is set out by the Forest Department in terms of the areas in which villagers from a certain village may exercise their rights. Rights are also specifically tied (both formally and in practice) to the ownership of land.

Most of the institutional responses of the *mahila mandal* are synergistic; the activities of the *mahila mandals* have complemented the efforts of other parties, and certain other conditions have supported the activities of *mahila mandals*. For instance, the Forest Department has started to enforce some of its rules in a more even-handed manner and often openly support the efforts of *mahila mandals* to enforce rules. Similarly, the construction boom has slowed, reducing demand for timber. Recent court cases against persons caught illegally felling timber have also acted as a deterrent against people cutting trees in village forest areas. Notwithstanding the contribution of other factors in the reduction of illegal activities in village forest use areas, many local people and Forest Department officials acknowledge the positive influence and dedication of some of the *mahila mandals* in the area.

Also noteworthy is the fact that the *mahila mandals* function at the village level and as a result, rules are adapted to the local situation. For instance, in Solang, illegal felling by villagers to supply the construction industry was not a concern because of the relative isolation and lack of road access to the village and the associated difficulties with transporting timber. The *mahila mandal* was concerned only with policing outsiders. Villagers were not subject to rules that prohibited the felling of trees. In contrast, Prini and Old Manali are both accessible by road and villagers are subject to incentives created by the black market for timber. In both these villages, villagers and outsiders are subject to *mahila mandal* rules prohibiting felling of trees. In Old Manali, the problems associated with illegal felling have become such a concern that the *mahila mandal pradhan* (president) aspires to expand the membership of the *mahila mandal* so that it may become effective in protecting the forest and working towards a healthier forest.

## Fuelwood choices

The rise of horticulture, specifically the cultivation of apple trees, in recent years in the Kullu Valley has provided the side-benefit of an alternative source of fuelwood. The use of pruned branches from apple trees alleviates some of the demand for fuelwood from the forest. Although no one indicated that they were able to meet all their household fuelwood needs from pruned branches from apple trees, villagers in Prini and Old Manali indicated that this is a conscious effort to decrease demand for fuelwood and a recognition that reducing pressures for fuelwood on the forest is beneficial.

> More people are using fuelwood from the apple trees and they are trying to protect the forest.
>
> (Old Manali, Sept. 22/99)

Similarly, certain species of shrubs are also used as an alternative source of fuelwood. The local rules-in-use that guide need-based fuelwood collection have changed and the common wisdom is to make use of non-forest and non-timber fuel.

Switching to non-forest derived sources of fuelwood such as gas for cooking is also occurring, but this is based on economic feasibility for individual households and is a response to changes in economic conditions. Non-forest derived alternatives for space heating through the winter months is beyond the economic means of the majority of people.

## Social objectives vs. Forest Department rules

Another common village level rule exists in response to Forest Department measures to regulate the use of timber. Permission is required before taking a tree for a cremation and funeral feast when there is a death in the village. Interviews from both Prini and Old Manali revealed that it was in fact socially acceptable to ignore this Forest Department regulation and take what is needed.

> For a funeral, no one makes things difficult if you cut a tree, but for other occasions you must ask the Forest Department.
>
> (Prini, Sept. 16/99)

> If someone dies you do not need permission for the wood for the funeral. You can cut a tree if necessary, a poplar or a whole tree.
>
> (Prini, Sept. 12/99)

In a similar fashion, because limited accessibility precluded difficulties with 'smuggling', the felling of trees by villagers in Solang was assumed to be need-based and was socially sanctioned within the village, regardless of Forest Department regulations. In fact, the felling trees by villagers was not even considered to be illegal by villagers in Solang,

> People cut trees for their own needs; illegal felling is not an issue.
>
> (Solang, Sept. 30/99)

> There are no problems with people from the village cutting trees and selling sleepers [timber], they are just bringing what they need for themselves.
>
> (Solang, Oct. 5/99)

In these instances, social and economic needs override ecological considerations and Forest Department rules. Although the practice itself may appear to disregard values which dictate that one should protect the forest, in effect it also indicates a capacity for the rules-in-use to be sensitive enough to distinguish between activities such as 'smuggling' that are purely destructive to the forest, and practices which are based on local social and economic needs and may not have seriously detrimental consequences for the forest.

## 'Breaking the Rules'? – the Forest Department

The instances of local people telling stories about bending or breaking the rules by members of the Forest Department are too numerous to be discounted. If true, such activity would indicate an institutional failure on the part of some members of the Forest Department. Indeed, Forest Department officials themselves acknowledge *past* corruption. Villagers have indicated that individuals in the Forest Department have received *baksheesh* (bribes) and in return have ignored individuals who sold the TD timber they were allocated, or felled more trees than were allocated, or who were simply cutting down trees with no pretence of applying for TD timber. The system allegedly became compromised to the extent that those who could not afford to pay *baksheesh* to Forest Department officials were not having their applications for TD timber processed. If these incidents are based in fact, the response on the part of the Forest Department is detrimental to the forest because it makes the Forest Department complicit in the illegal felling of trees.

Perhaps more importantly, allegations of corruption damage the credibility of the Forest Department, impact the already precarious trust relationship with local villages, and reinforce any justifications on the part of local people who are felling trees. As one man from Old Manali explained,

> How can the Forest Department tell people to stop cutting green trees and smuggling when they are involved in the business? It is laughable when they try to tell people not to harm the forest.
>
> (Old Manali, Sept. 28/99)

## 'Breaking the Rules'? – local people

Although it is tempting to criticize the Forest Department for bowing to pressures, the reality

is more complex. Local people have responded to the creation of a black market for timber in a way that is perhaps predictable. Illegal felling by villagers in Old Manali and Prini has been accomplished either by simply flaunting the regulations prohibiting felling of trees or through circumvention of the TD system,

> The people who are building hotels have used smuggled timber. They have not purchased the timber at market rates, but from local smugglers.
>
> (Old Manali, Oct. 26/99)

> When someone is granted one tree for TD entitlement, they cut four or five trees in order to sell them illegally. The smugglers pay money and the Forest Department allows this to happen. The Forest Department is the problem.
>
> (Old Manali, Sept. 22/99)

Breaking the rules by local people also can be viewed as a failure of social capital and local trust relationships. As Hanna (1998: p. 201) explains, '[t]he development of markets for any natural resource introduces strong pressures on resource appropriators to maximize short-run gains at the expense of long-run sustainability.' This incentive to take advantage of opportunities created by markets is a temptation that has been documented time and time again (Ciracy-Wantrup and Bishop 1975; Hanna 1998). In this case, market incentives were reinforced by the alleged corruption within the Forest Department that helped to facilitate illegal felling of trees. The threat of social disapproval and the confidence in the capacity of others to forego the short-term economic benefits to be had from depleting the resource were clearly insufficient to prohibit illegal felling.

According to villagers, those who could afford to encourage the Forest Department and other village officials to ignore rules were those that realized the benefits of 'smuggling' timber. Thus, divisions within the community along economic lines were reinforced and enhanced with the emergence of this lucrative and damaging activity.

## Analysis of institutional responses

The institutional responses discussed within this chapter are responses to pressures on the forest social–ecological system in the Manali area. These problems and pressures, summarized in Table 1, largely result from recent forces driving urban growth in the town of Manali. Some of the effects and implications of the institutional responses to the pressures on the forest social–ecological system have been outlined. These effects and implications are relevant to the resilience of the forest social–ecological system in a variety of ways.

Table 2 summarizes an analysis of institutional responses and their effects on system resilience. The effects on system resilience of each institutional response were analyzed in the context of the three characteristics of resilience described by the Resilience Alliance (2003) and this forms the basis for the outcome of the institutional response as it relates to each of the resilience characteristics. Although Table 2 is fairly detailed and self-explanatory, the effects on system resilience listed have a basis in the resilience literature and some require explanation.

### *Management responsibility*

Management responsibility is referred to in several instances in Table 2, both in the context of reinforcing state control over management of the forest and with regard to encouraging or promoting local responsibility for management. Closely linked to promoting local responsibility for management is the idea of the presence of shorter feedback loops, both of which promote resilience. In resilience discussions, local rule making promotes quick feedback and prompt response to changes; more hierarchical decision processes can be costly and time-consuming to coordinate (Hanna 1998). Levin *et al.* (1998) further explain tight feedback mechanisms as a coupling of stimulus and response in space and time, accomplished by embedding management responsibility in the local context.

Embedding management responsibility in the local context and promoting tight feedback loops have a positive effect on system resilience through increasing capacity for self-organization, and for learning and adaptation – two characteristics of resilience. As an example, the adoption of JFM as Forest Department policy potentially encourages the embeddedness of management responsibility in the local context through joint responsibility with Village Forest Development

**Table 2** Institutional responses to problems of the forest social–ecological system and outcomes with respect to resilience

| *Response* | *Effect of response on system resilience* | *Resilience characteristics* | *Outcome* |
|---|---|---|---|
| 1. Establishing fuelwood depot (Forest Department) | Subsidized fuelwood – positively impacts health of the forest; is an adaptation to ecological and economic changes; reinforces efforts of local *mahila mandals* | 1. absorb change<br>2. self-organization<br>3. learning and adaptation | 1. +<br>2. 0<br>3. 0 |
| 2. Strengthening of Timber Distribution system by Forest Department | On surface, positively impacts forest health; reinforces management and decision-making as domain of the state, further alienates local responsibility; does not promote shorter feedback loops; limits accessibility and claiming of rights | 1. absorb change<br>2. self-organization<br>3. learning and adaptation | 1. +<br>2. –<br>3. – |
| 3. Adopting Joint Forest Management as a policy (Forest Department) | Potentially is an adaptation to ecological and economic change; potentially encourages embeddedness of management responsibility in local context; promotes shorter feedback loops; builds redundancy; promote trust with local communities; potentially builds capacity to increase local ecological knowledge | 1. absorb change<br>2. self-organization<br>3. learning and adaptation | 1. +<br>2. +<br>3. + |
| 4. Implementing Joint Forest Management (Forest Department) | Imposes institutions as opposed to creating context or conditions out of which appropriate institutions can emerge; does not give legal recognition or support to local systems; not true sharing of resource management and power; ignores social heterogeneity; limited opportunity to build trust with local people | 1. absorb change<br>2. self-organization<br>3. learning and adaptation | 1. 0<br>2.0 or –<br>3.0 or – |
| 5. Monitoring, exclusion of non-rightholders, banning sale of fuelwood, discouraging lopping (all by *mahila mandals*) | Promotes health of the resource; is an adaptation to ecological and economic change; promotes embeddedness of management responsibilities in local context; promotes shorter feedback loops; monitoring leading to corrective responses; maintains and enhances institutional memory; builds ecological knowledge | 1. absorb change<br>2. self-organization<br>3. learning and adaptation | 1. +<br>2. +<br>3. + |
| 6. Switching to alternative sources of fuelwood (local people) | Promotes health of the resource; is an adaptation to ecological and economic changes; is an example of shorter feedback loops, incorporates flexibility into rules | 1. absorb change<br>2. self-organization<br>3. learning and adaptation | 1. +<br>2. +<br>3. + |
| 7. Overriding Forest Department rules for appropriate social and economic reasons (local people) | Is an example of how local institutions can allow for exceptions that serve local village social objectives; incorporates flexibility into rules; builds social capital; but does not necessarily promote forest health | 1. absorb change<br>2. self-organization<br>3. learning and adaptation | 1. +<br>2. +<br>3. 0 |
| 8. Bowing to pressures to break the rules (Forest Department) | Institutional failure on the part of regulators; negatively impacts forest health; negatively impacts trust relationship with local people; perverse leaning | 1. absorb change<br>2. self-organization<br>3. learning and adaptation | 1. –<br>2. –<br>3. + |
| 9. Bowing to pressure to break the rules (illegal felling by local people) | Failure of social capital and local trust relationships; negatively impacts forest health; creates and/or reinforces divisions within the community; perverse learning | 1. absorb change<br>2. self-organization<br>3. learning and adaptation | 1. –<br>2. –<br>3. + |

**Legend:** + indicates positive response regarding resilience
– indicates negative response regarding resilience
0 indicates response is neutral or undetermined

Committees. Empowerment is possible through joint arrangements, contributing to the capacity for self-organization. Local management, by closing the gap between use and management, also shortens the feedback loop that regulates responses to resource changes and also increases opportunities for local learning and adaptation.

Conversely, the opposite can be argued in the context of the Forest Department response of strengthening the Timber Distribution system where one of the effects on system resilience was to reinforce management responsibility as the domain of the state. As Hanna and Jentoft (1996: p. 47) remark, '[from the perspective of the local community, bureaucratic involvement in resource management can disembed (sic) management responsibilities from local contexts of interaction', affecting feedback loops and also potentially the capacity for self-organization.

### *Redundancy and heterogeneity*

Redundancy, in the discourse of ecological resilience, contributes to the capacity to adapt to changes and is usually discussed in terms of redundancy of structure and function (Holling *et al.* 1995). Additionally, 'having many management units located at smaller scales backed up by larger scale coordination arrangements appears to generate more resilient management of resources, rather than relying in a single, all encompassing management unit' (Resilience Alliance, 2003) is another way of thinking about redundancy. It is in this sense that the adoption of JFM as a policy builds redundancy (Table 2).

### *Imposition/Facilitation of institutions*

Imposed institutions and institutional structures can be adapted and incorporated into local systems (*mahila mandals*, for instance), especially when flexibility and inclusiveness needs are part of the structure. However, another approach is to formally recognize and support local systems and or share resource management and power between government agencies and local institutions, as suggested by Folke and Berkes (1998). Thus, the emphasis should be on creating context or conditions out of which appropriate institutions can emerge, facilitating a learning and adaptation process.

Although JFM is promoted as a power-sharing arrangement, as opposed to a mechanism for lending support to local systems, under JFM new institutional structures are created and institutions imposed; local people are not involved in the design of the structure of committees, nor are they involved in what Ostrom (1990) refers to as collective choice rules and constitutional choice rules.

### *Flexibility*

Flexibility is also characteristic of resilient systems, generally allowing adaptation to ecological and economic changes (Hanna and Jentoft 1996). Flexibility, specifically in reference to rule making, 'allows revision of management decisions that do not lead to the desired outcome' (Hanna 1998: p. 204). With reference to the first resilience characteristic, it can be argued that flexibility contributes to system capacity to undergo change and still retain controls on structure and function. However, flexibility in rule making is perhaps more relevant in terms of capacity for learning and adaptation. To illustrate, local peoples' decisions to override certain Forest Department rules for social and local economic reasons show flexibility that the state does not entertain. However, by maintaining the broader system of social values and cultural practices, and by serving local needs, flexibility in rules may contribute to overall capacity to undergo change and to self organize – two of the resilience characteristics.

### *Institutional memory and ecological knowledge*

Institutional memory is 'memory of experience which provides context for modification of resource use rules and regimes' (Berkes and Folke 2002: p. 123). This memory can be built and retained through the generation, accumulation, and transfer of ecological knowledge, which are key to the capacity to actively adapt to disturbance (Folke and Berkes 1998). Ecological knowledge, is a source of capacity for learning and adaptation, and through institutional memory it contributes to system capacity for self-organization by making possible a response with experience (Berkes and Folke 2002).

**Table 3** Institutional responses and contributions to forest social–ecological system resilience. Response items refer to Table 2

| *Contribution to overall resilience of the forest social–ecological system* | *Institutional response* |
|---|---|
| Positive | • Monitoring, exclusion of non-rightholders, banning sale of fuelwood, discouraging lopping by *mahila mandals*<br>• Adopting Joint Forest Management as a policy by the Forest Department<br>• Switching to alternative sources of fuelwood by local people<br>• Overriding Forest Department rules for appropriate social and ceremonial reasons by local people<br>• Establishing fuelwood depot by the Forest Department |
| Ambiguous or perhaps negative | • Implementing Joint Forest Management by the Forest Department |
| Negative | • Strengthening of Timber Distribution system by the Forest Department<br>• Bowing to corruption pressures (Forest Department)<br>• Bowing to corruption pressures (local people) |

In the context of Table 2, the activities of village *mahila mandals* – monitoring and creating new rules in response to resource depletion – are actions that are based in ecological knowledge, but also potentially build ecological knowledge. Further, monitoring that leads to corrective responses, in and of itself, is important for resilience (Holling, 1995). Taking action in the face of changes to forest resources builds institutional memory for decisions regarding future changes in the forest, but only if the knowledge is transferred from one generation to the next.

### *Perverse learning*

Although the assumption is often made, and is indeed intuitive, the results of learning processes do not necessarily produce positive outcomes. Learning can occur that results in a negative social outcome. When rules are broken, actions are nevertheless reinforced by the benefits derived and there is often creativity involved in the process. Learning simply becomes perverse as it benefits neither the resource nor society; only individuals benefit from activities that break or circumvent rules. In both responses involving rule-breaking – on the part of the Forest Department and local people – perverse learning results in a positive outcome with respect to the third resilience characteristic, the capacity to learn and adapt. However, it should be emphasized that the learning is perverse because it benefits few at the expense of many and endangers the forest resource.

## SYNTHESIS AND CONCLUSIONS

The analysis provides outcomes of institutional responses with respect to each of the three characteristics of resilience. From these outcomes it is possible to comment as to how each institutional response affects or contributes to the overall resilience of the forest social–ecological system. Table 3 is a summary of institutional responses and the contributions to overall resilience.

To recap, a resilience framework is used to examine institutional responses to development pressures from a broader perspective. The starting point is the idea that institutional responses could be assessed as to whether and how they were affecting the buffering capacity of the forest social–ecological system, and therefore impacting resilience. This assertion is based on linking three ideas from the resilience literature. The pressures of the forest social–ecological system provide the context for the discussion of institutional responses. The outline of institutional responses details some of the more direct effects regarding resilience. The synthesis links effects of institutional responses to the characteristics of resilient systems, which provide the basis for evaluating the outcomes of institutional responses in terms of resilience characteristics as depicted in Table

2. From the outcomes to each of the characteristics of resilience, institutional responses may be contributing positively, or in a neutral fashion, or negatively to overall forest social–ecological system resilience (Table 3).

Institutional responses that contribute positively to overall resilience of the forest social–ecological system include the activities of the *mahila mandals*, adopting JFM policy, upholding local rules in the face of contradicting Forest Department rules, establishing the fuelwood depot, and switching to alternative fuelwood sources. The implementation of JFM by the Forest Department appears to be a neutral response or perhaps may even negatively impact overall forest social–ecological system resilience, in contrast to the positive contribution to resilience that the adoption of JFM appears to make. In this analysis, perceived corruption emerges as institutional failure at both state and local levels. The strengthening of the Timber Distribution system also serves to contribute in a negative manner to overall resilience of the forest social–ecological system

The analysis of institutional responses helps identify areas where institutional capacity exists and should be nurtured, and highlights areas where strengthening of institutional capacity is perhaps needed. Clearly, institutional capacity currently exists at all levels; responses that contribute positively to system resilience are drawn from informal and formal institutional responses and span local and state levels. The fact that institutional capacity exists is perhaps not surprising, given the long history of both local villages and the Forest Department. However, the actions of the Forest Department, as exemplified by the manner in which Joint Forest Management is being implemented, do not indicate a true recognition of either the robustness of local institutions or the institutional capacity at that level.

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