Does Community Forests Management Supports Biodiversity Conservation? Evidences from Two Community Forests from the Mid Hills of Nepal[1]

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Abstract

The Community Forests Management approach in Nepal is one of the most cited success stories for managing common property resources. It has been argued that the approach is successful in improving the supply of forest products, improving the environmental situation in the hills, rehabilitating degraded hills and also increasing biodiversity. It is claimed that the approach offers an attainable means to conserve the biodiversity of Nepal. However, the prevalent management approach in community forestry indicates increasing threats to the conservation of biodiversity. This paper is based on the findings from two community forest users groups from the middle hills of Nepal and argues that the prevalent forest management approach in community forestry recognizes biodiversity conservation as secondary issue and there is evidence that biodiversity has either declined or has been altered in community managed forest.

Key words: Nepal, community forestry, biodiversity conservation, and livelihoods

INTRODUCTION

The dominant land use system of Nepal is forestry, and forests are very important from a socio-cultural and economic point of view. Forest provides food, medicine, energy, shelter, bedding materials, wood and non-wood products to maintain and sustain the subsistence-farming system in rural areas of Nepal. Farm, forest and livestock are three highly integrated constituents of the hill farming system and cannot be separated from each other (Gilmour and Fisher 1991; Mahat 1987). About 83 percent of the people depend on subsistence farming, therefore there are very few forests in the hills of Nepal that are not under heavy pressure from the surrounding villages (Gilmour and Fisher 1991; Griffin 1989). The latest data reveal that Nepal comprises 29 % of forest, 10.6 % of shrub and 12 % of grassland (DFRS 1999).

Rural people, because of their dependence on a variety of forest products to maintain their subsistence agriculture, have for a long time played an important role in the use and management of the forests (Gilmour and Fisher 1991; Fox 1983). In addition, Nepalese societies have recognized some plant species as sacred plants and have a long established history of preserving biodiversity for cultural and spiritual values (Ingles 1994). Rural people prefer some plant species more than other for different purpose and, hence, there is a need to maintain a wide number of species (Jackson and Ingles 1994).

About 32 % of Nepal's forest occurs in the mid-hills, and this has the greatest ecosystem and species diversity (HMG/N 2002). On the other hand, there are complex relations between the forests, agriculture and human subsistence (Gilmour and Fisher 1991; Mahat 1987). The mid-hills' ecosystem is less represented in the protected area management system. The possibility of extension or establishment of protected areas is limited and 19 forest ecosystems are not represented within the protected area system (Table 1) and contain 49 out of 60 threatened flowering species in Nepal. Biodiversity Profile Project/Nepal (BPPN), 1995 reported a loss of nine flowering plants from Nepal, out of which seven species were from the mid-hill zones. The reasons for the loss of biodiversity in

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Nepal is mentioned as low levels of public awareness and participation, high population pressures and incidence of poverty, weak institutional, administrative, planning and management capacities, lack of integrated land and water use planning, inadequate data and information management and lack of policies of strategies for biodiversity conservation (HMG/N 2002).

Table 1. Ecosystem identified by Dobremez (1970) and their representation in protected areas

Physiographic zones	Total no. of ecosystems	Number in protected areas
Terai	10	10
Siwalik hills	13	5
Mid-hills	52	33
Highlands	38	30
Other	5	2
Total	118	80

Source: Maskey 1996

The community forestry is the most successful approach to manage fragmented, degraded and scattered forest patches in this region. On the other hand, DFRS (1999) reported annual rate of deforestation in the mid-hills during the period of 1978/79 to 1994 to be 2.3%. The protection of degraded forest through community forestry has improved forest condition in the hills of Nepal and has positive impacts on biodiversity conservation (HMG/N 2002; McNeely 2002; Mikkola 2002; Malla 2000; Springate-Baginski *et al.* 1998; aus der Beek *et al.* 1997; Jackson and Ingles 1994). Similarly, the increased greenery in the hills has positive impact in conserving water sources and controlling soil loss. The availability of forest products such as firewood, timber, fodder, agricultural implements, leaf-litter, and grasses have positive impact on life support system in the hills of Nepal. Best utilizing the community forests could be a suitable option to conserve biodiversity. However, there are indications that Community Forestry User Groups (CFUGs) are moving towards providing sustainable forest product needs whereas the biodiversity issue receives less priority. There is ambiguity about the extent to which community forestry can support biodiversity conservation because it aims to supply forest products to local users rather than to conserve or maximize biodiversity.

It is widely recognized that prevalent forest management strategy of CFUGs is protection-oriented or passive (Acharya 2002; NPC 2001; Shrestha 2000; Branney 1996; Karki *et al.* 1994) resulting in fewer benefits than otherwise could have. The term "protection-oriented" refers to the forest management system allowing only for the collection of dry wood and twigs as well as certain non-wood forest products such as leaf litter for animal bedding and compost (Branney 1996). Contrary to protection-oriented forest management system, production-oriented forest management system involves carrying out of silvicultural and harvesting operations as demanded by the forest condition to improve forest productivity (Acharya 2003). Recently, there is evidence that CFUGs are slowly moving towards active forest management (Khanal 2002; Singh 2002; Wagley 2002; Neupane 2000; Kanel *et al.* 2003). Such active forest management by CFUG can lead to an increased supply of forest products without damaging the forest resource base. In addition, increased supply of forest products results in increased benefits to users and consequently leads to the overall improvement of the livelihoods of the rural people.

This paper argues that rural people with subsistence agriculture do not put equal value on all plant species growing in their forest and putting equal value on all species may not produce forest products as can be produced by maintaining few fast growing multi-purpose tree species. The aim of the paper is to examine the impacts of forest management on biodiversity in the Mid-hill region of Nepal. The key questions to be addressed are: How do community forestry policy and practices as implemented by HMG/N affect community forest management? If so, how are they affecting forest composition in ways that promote or threaten the biodiversity? What conditions favor conservation and development

of biodiversity in community forestry? Can community forests be managed sustainably from biodiversity conservation point of view?

MATERIALS AND METHODOLOGY

The study was conducted in two CFUGs in the Mid-hill region of Nepal, namely Bharkhore CFUG and Kali Gandaki CFUG in Parbat district. The focus was given to select CFUGs, which were located in similar socio-economic and ecological conditions having almost equal area and forest types. It was intended to select two CFUGs having almost same biophysical factors except management regime so that the impacts of forest management can be assessed. Out of the two, one was actively involved in forest management for a longer period (10 years) and the next was involved relatively recently (3 years). The forest biodiversity information was collected through transect walking and informal interviews with the members of the CFUGs applying tools and techniques of Participatory Rural Appraisal (PRA). Transect walking was carried out in six transects at three different altitudes in east-west and north-south direction in each of the CFUGs. The species information was verified in informal discussions with the local people. Some of the key features of two CFUGs are presented in the Table 2.

Table 2. Bio-physical and socio-economic characteristics of the study sites

Characteristics	Bharkhore CFUG	Kali Gandaki CFUG
Location of forest	Siwalaya-3, Parbat	Siwalaya-3, Parbat
Altitude	900 m. - 1200 m.	900 m. - 1200 m.
Aspect	Southern	Southern
Topography	Typical hills and slopes	Typical hills and slopes
Forest origin	Natural forest	Natural forest
Forest type	*Shorea-Schima*	*Shorea-Schima*
Forest area	57.5 ha.	83.10 ha.
Forest development stages	Pole forest	Pole forest
No. of households	113	314
Access	Connected with black paved road	Connected with black paved road
Distance from district headquarter	1 km	2 km
Years managing the forest actively	10 years	3 years

Limitations

The information was collected through transect walk and no quantitative ecological parameters were used. There is a lack of base line information to compare the species changes within the community forests. It was assumed that other factors except different management regime have no effect on forest plant diversity. It was also assumed that shrub and tree species are main concerns in community forestry and the study was limited to shrub and plant species.

RESULTS AND DISCUSSIONS

Forest Management Planning

Although scientific forest management is relatively a new concept in Nepal, both the CFUGs are implementing forest management activities in a systematic way. The forest is divided into different blocks mainly based on natural boundaries. Such blocks make it possible to regulate the yields of forest products and to manage the forest in a sustainable way. Such area based yield regulation is the only viable option in community forest, where rural people implement management and no site-specific growth data is available (Acharya 1997). Forest protection measures promoting biodiversity

in these two community forests includes prohibition to wildlife hunting, forest fire and grazing control, forest encroachment control, conservation of soil erosion prone area and conservation of water source area. However, there is no special species conservation programs included in the Operation Plan (OP) of any of the CFUGs.

The forest management objectives set by both the CFUGs are presented in Table 3. The table clearly shows that both the CFUGs have almost similar objectives and are mainly motivated to produce forest products where biodiversity conservation is not a stated management objective. It can be inferred that biodiversity conservation has not been identified as a primary objective rather it can be considered as an externality.

Table 3. Forest management objectives of the users

S.N.	Bharkhore CFUG	Kali Gandaki CFUG
1	To fulfill the basic needs for forest products such as fuelwood, fodder and timber.	To fulfill the basic needs for forest products such as fuelwood, fodder and timber.
2	To control soil erosion	To control soil erosion
3	To conserve the natural water spring	To conserve the natural water spring
4	To conserve forests for the future generations	To protect wildlife
5	To maintain the greenery and ecological balance and increase the villages' beauty.	To maintain the greenery and ecological balance and increase the villages' beauty.

Number and Nature of Species and their Preferences

The forest type found in both the community forests is mixed *Shorea-Schima* forest[2] dominated by *Sal* (*Shorea robusta*) species. A total of 46 tree species and 33 shrub species were found in the study area. Out of total 46 tree species, 27 tree species were common to both of the CFUGs and out of 33 shrub species 29 were common to both of the CFUGs. However, the number of species of both the plant forms (28 trees and 29 shrubs in Bharkhore compare to 45 trees and 33 shrub species in Kali Gandaki) was found to be higher in Kali Gandaki CFUG, which started forest management later than the Bharkhore CFUG.

The number of tree and shrub species found in the Bharkhore CFUGs in 1978 when they started protection was 17 and 20 respectively, which increased up to 28 species of shrubs and 29 species of trees in 2003. It is clear that there has been a significant increase in plant diversity as a result of forest protection. However, present user preferences and existing management practices threaten the maintenance of these species with their appropriate population and distribution in community managed forests.

The assessment of user preferences over the species shows that there were 28 tree species in Bharkhore CFUGs out of which 18 species were preferred. In Kali Gandaki CFUG, there were 45 tree species out of which only 15 species were preferred. Similarly, it was observed that all the 33-shrub species were categorized as non-preferred species by both the CFUGs.

Understanding Forest Management

Forest Management is defined as the application of the knowledge, which has been acquired in all branches of forestry and the allied sciences to the management of forests in the interest of man

[2] *Shorea-Schima* is a forest type which is not defined earlier for example Stainton (1972), However, it is now increasingly recognized as a forest type in the mid-hill region, for example Kanel *et al.* 2003.

(Jerram 1983) where silviculture is a branch. However, the CFUGs understand two silvicultural activities namely "*Godmel*" and "*Jhadi katne*" as surrogate of forest management. The term *"Godmel"* means creating favorable environment for the main crop. The activities understood are weeding, singling, thinning and pruning. The CFUGs have adopted these activities, as an opportunity to remove all unwanted species from the forest, which, of course, could be essential to enhance desired wood productivity. The main targeted plants are shrubs and low quality timber species (*Kukath)*. The *"Godmel"* has caused reduced diversity of tree species and modified forest structure and composition. The literal meaning of the term *"Jhadi katne"* is the removal of shrubs species. The *"Jhadi katne"* has converted all shrub land forests to high forest where tree species are protected and shrubs are removed. It can be inferred that present forest management strategy is directed towards the production of medium term to long-term products, i.e. mainly wood products.

Nature and Kinds of Forest Management Operations

The CFUGs are applying a wide range of silvicultural practices appropriate for the community forest. Selective felling, singling, thinning, pruning, lopping, and weeding/cleaning are highly prioritized operations followed by fire control, grazing control, plantations, soil conservation work and leaf litter collection. Promoting natural regeneration is not in itself an operation carried out but the result of other activities like selective felling, thinning, singling, weeding/cleaning, fire control and grazing control in favor of the natural regeneration. These forest management operations include plantation to protection of natural regeneration, and their application depends on the nature and kind of forest blocks. The application of such activities may promote uniformity in species composition, spacing and canopy development.

Retaining or Removing a Species

The CFUGs have developed some criteria to determine the species to be retained or to be removed during the silvicultural operations. The main criteria to retain are the usefulness of the species to provide their forest products needs, i.e. ability to produce timber, fuelwood, fodder, non-timber forest products and plants of medicinal value and fast growing multipurpose species, and in open area any species of perennial nature. The criteria to remove a species are all shrubs, thorny species, dead, dying and diseased parts of all species, competing species and individuals of main crop and low quality timber species.

Selective Approach for the Species

CFUGs have analyzed community forests only for socio-economic factors and identified silvicultural practices, ignoring the ecological factors that bear up on it. The best fulfilling of stated productivity enhancement management objectives can be achieved through the selective approach to the species. Users do not want species, which do not give direct benefits, and they prefer multipurpose tree species that specially produce firewood, timber, fodder, and medicinal values. Until this time, users have identified almost all shrub species in this category. This is a serious issue and it is possible that all shrubby species may be eliminated from mid-hills from community-managed forests. In addition, tree species recognized as *Kukath* are removed, as users think that such species have no value to maintain forest products production and its quality. Users have also made some plantation of species, which they think are useful in supplying quick forest products. Such selective species approach in the community forest management would cause change and or altered forest structure and composition. The most prioritized species is *Shorea robusta* and priority of this species has gradually changed forest composition to be monoculture.

The strategy to select species only to maximize wood production having no priority for biodiversity contradicts with earlier studies of Jackson and Ingles (1994) and Dahal (1994). They claimed that CFUGs are more effective in forest management with higher number of species due to the

opportunity to obtain wide varieties of products. It would be more logical to mention that CFUGs are more effective to manage with higher number of useful species. It can be said that forests with high level of diversity are not always preferred by CFUGs. aus der Beek *et al.* (1997) claimed that there were specific clauses included in OP of the CFUGs to conserve biodiversity and provided examples from 5 CFUGs, however all these conservation efforts are directed to conserve high value tree species in the area such as *Quercus spp*.

Implications of Active Forest Management on Biodiversity

The most successful implementation of community forestry is in the mid-hills, where CFUGs are increasingly implementing active forest management strategy as mentioned above. The CFUGs most commonly understood forest management by the term *"Jhadi katne"* (shrub clearances) followed by *"Godmel*" (singling, thinning etc). On the other hand, the mid-hill ecosystem is less represented in protected area management system. It can be seen that the active management for the production of timber in community forests by the CFUGs threats the local elimination of shrub species and low quality timber species from the community-managed forests. It is very hard to develop resilience against cumulative impacts of cutting by all species growing in the forest. There are at least three different management regimes being practiced by the CFUGs of Nepal. These management regimes and their potential impacts on biodiversity and the resulting situation are presented in the Table 4 and Table 5.

Table 4. Community forest management regimes and their impacts on biodiversity

Forest Management regime	Level of disturbances	Impacts on forest products/biodiversity	Resulting situation
Protection-oriented (Passive management)	Minimum disturbances	Limited forest products, Reduced productivity, and Not necessarily increased biodiversity	Loose-loose
Production oriented to major wood products (Active management)	High level of disturbances	Increased productivity, Benefits to wealthier households, and Decreased biodiversity	Win-loose
Production oriented for multiple products management (Active management)	High level of disturbances	Increased productivity, Products benefits to poorer households, and Increased/conserved biodiversity	Win-win

Table 5. Forest management operations and their impact on plant diversity in community forests

Operation	Actions	Effect	Impact on biodiversity
Cleaning/ Weeding	▪ Removal of competing unwanted, individuals ▪ Removal of all unwanted plant	▪ Decreased species number, ▪ Improved forest health, ▪ Alternation in canopy, ▪ Forest structure and composition changed	▪ Reduced diversity, ▪ May cause species loss, ▪ Habitat loss, ▪ Negative to ground vegetation
Singling	▪ Removal of multiple stems	▪ Reduced density, ▪ Alternation in canopy, ▪ Forest structure and composition changed	▪ May be not negative, ▪ Habitat loss, ▪ Negative to ground vegetation
Thinning	▪ Removal of unwanted species, ▪ Removal of competing	▪ Decreased species number, ▪ Alternation in canopy ▪ Forest structure and	▪ Reduced diversity, ▪ May cause species loss, ▪ Habitat loss /ground veg., ▪ Development of modified

	individuals	composition changed, ▪ Decreased stand density	forest types
Selective felling	▪ Removal of mature old trees	▪ Alternation in canopy, ▪ Forest structure and composition changed,	▪ Reduced diversity, ▪ Habitat loss
Plantation	▪ Introducing new species, ▪ Planting existing species	▪ Forest structure and composition changed	▪ Increased diversity, ▪ Alters forest composition, ▪ Development of modified forest types, ▪ Increased ground vegetation, ▪ Development of modified forest types

The Department of Forest is the main implementing agency of community forestry program. The organizational structure of the department has not changed either at district, *Ilaka* or range post level or at the central level for the past 10 years (Table 6). The number of staff providing for all types of services to the CFUGs has also been unaltered. In this situation, possibility to increased level of post-formation support to CFUGs is extremely limited. Due to lack of an effective support service mechanism, the importance of biodiversity conservation has not reached up to the users level. There are evidences that the decision making process in community forestry has been controlled by few wealthier houses (Gentle 2000; Malla 2000; Timsina 2002). This condition favor for intermediate or long term benefits, which are obtained from few selected tree species and consequently reduced diversity.

Table 6. Comparison of CFUG number and organizational set for the past ten years

Year	No of CFUGs	No of DFOs	No of Forest Officers	No of Ilaka offices	No of Range posts	No of Forest Rangers	No of Forest Guards	Workload Increase percentages
1993	4,000	74	246	92	698	1,189	2,793	>300 %
2002	12,584	74	246	92	698	1,189	2,793	

Source: DoF 2002 and 2003; DFO stands for District Forest Offices

CONCLUSIONS

Community forestry is the main strategy in Nepal's forestry sector policy. Over the past 24 years, tremendous shift in policy and legislation has occurred to empower users as the managers of forest. The program is successful in increasing the greenery of degraded sites, in forming local level institutions for resource management, in improving the supply of forest products to farmers and in improving the environmental situation in the hills of Nepal. There are arguments claiming that community forestry management can be seen as an attainable means to conserve Nepal's biodiversity. The statement seems true in earlier phase where CFUGs were not implementing active forest management activities and receive fewer benefits. However, there exists uncertainty about the contribution made by the program on biodiversity conservation issue. On the other hand, it is increasingly recognized that CFUGs must implement active management in order to realize direct and increased levels of benefits from community managed forests. The present study based in two community forests in the mid-hills of Nepal indicates that active management by CFUGs contradicts with biodiversity conservation.

There are at least three different types of changes taking places in terms of forest structure and composition. Firstly, the forest types are slowly converting from mixed (*Sal* mixed) to monoculture (pure *Sal*). Secondly, the shrub and tree diversity is gradually decreasing. Lastly, the most critical

threat is for the shrub lands and shrub species. It suggests that shrub land areas are gradually converting to high forest and shrub land species are gradually disappearing. This intervention may lead to the local elimination of shrubs and low quality timber species from community managed mid-hill forests and to an overall change in forest types. The mechanism and process is not a gradual conversion of shrub lands to high forest through natural ecological process. The rapid and human induced disturbances modify natural environment, ecological processes and systems through the mechanism of species preferences and silvicultural application. Moreover, the number of tree species may greatly be reduced and low quality timbers species are in threat. The extensive application of active forest management favoring specific useful plant species at the expense of others may introduce more homogeneity into the forest structure with consequent loss of biodiversity. Such situation will lead to the creation of modified forest types and ecosystem in the mid-hills of Nepal ultimately affecting ecological functions and services of forests.

The present wood products oriented management regime to meet basic requirements ignores the concerns for all life forms supported by the forest. It also ignores the fact that the production of different products requires maintaining of a wide variety of habitats including closed canopy forest to open land. Although, almost every silvicultural practice affects biodiversity in some way, the value of biodiversity should be more fully recognized so that costs of conserving biodiversity must be perceived as better economic and environmental alternatives. This calls for awareness at the CFUG level. The forest management approach must include conservation of full variety of life to maintain complex ecological values and not just for the production of few high value timber products. This includes the maintenance of natural ecosystems in terms of species, size and relative numbers and a mechanism to realize benefits of biodiversity conservation at users level. Additional extension services and incentive policies are needed to minimize loss of biodiversity while fulfilling demands of forestry products to the rural people.

The Master Plan for the Forestry Sector being prepared in late 80's has put little importance on biodiversity issues. However, recently prepared Nepal Biodiversity Strategy (2002) has identified community forestry as an important approach for the successful conservation of biodiversity, which needs to include detail action plan to avert the situation. The increasing evidences of conservation threats to biodiversity outside protected areas particularly for shrubs and tree species can be minimized by placing proper attention in the community forestry management process and practices. The inclusion of biodiversity as a priority program in national forest policy, awareness creation about the importance of biodiversity at the user group level, updating baseline information on biodiversity issues addressing current status, trends and threats to biodiversity, identification of threatened species and their distribution study and biodiversity recording at local level are some of the key areas where immediate action is necessary to conserve biodiversity in community managed forests.

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COMMENTS FROM REVIEWER

K. P. Acharya's research is one of the few examples of efforts to gather empirical data regarding the link between biodiversity and forest policy options in Nepal. It is thus of some importance and his conclusions deserve proper scrutiny.

As the author attests, community forestry has been hugely successful in reversing forest degradation, and hence biodiversity loss, in all ecosystems where it has been applied. This has indeed been largely the result of protection-oriented management strategies. However, the results of this study appear to indicate that a shift towards more active management of community forests will endanger continuing improvement in the biodiversity status of these ecosystems.

Leaving aside the limited scope of the study, covering only two communities forest user groups, and hence the difficulty of drawing conclusions on a national scale, the author has made some questionable assumptions. To begin with, it should be pointed out that the term 'biodiversity' is relatively new to the English language (it is still picked out in MS Word spell check!) and the accepted Nepali translation – '*jaivik bibidhata*' – is not widely recognized among rural communities in this country. This by no means implies that the concept is alien to such communities – quite the reverse. In a survey carried out in Eastern Terai and Mid-hill districts in 2003, covering 21 CFUGs, it was quite clear that species diversity is valued by forest users as an indicator of overall ecosystem health. In Table 3 of this paper, moreover, the fourth and fifth management objectives of both user groups are intrinsically linked to biodiversity.

In spite of these management objectives, the paper asserts that neither group has taken account of biodiversity conservation measures when conducting forest operations. In the forest, which underwent production-oriented management from 2000 onwards, he records 50% more woody plant species than in the forest which has been 'actively' managed since 1993. The former forest

is 50% larger in area, a factor which may go some way towards explaining this disparity (all other variables being roughly equal), regardless of differences in management.

An over-simplified approach to forest management indicates poor advice and support from DFO staff and service providers rather than a lack of understanding of the importance of biodiversity on the part of forest users. The 'yes or no' responses to species preference, furthermore, do not provide any room for evaluating the different value systems and use categories employed by CFUG members. Their assessments of species value are far more complex and sophisticated than the author allows for.

Far from aiming for monocultures of high-value timber species, forest users in both the hills and Terai prefer a mix of products; witness the low value placed on Pinus plantations by groups across the country. The renewed dominance of *Sal* in newly protected degraded forest in parts of the Churia and Mid-hills is due to the nature of the species as a fast-growing pioneer. The conversion of shrub to high forest, for the same reason, is more a return to natural forest cover than a calculated destruction of a distinct shrub land ecosystem.

This paper, in short, contains no evidence to back up the conclusion that a trend towards more active forest management constitutes a threat to biodiversity in community forests. Indeed, the term 'active forest management' is something of a tautology. Management implies activity, which results in modification of ecosystems. This is not a revelation. We should, instead, frame the discussion in terms of the shift from protection-oriented strategies to those which reflect the needs and priorities of users groups. Biodiversity concerns are not at risk from this shift. CFUGs in many parts of the country have shown that they are quite capable of understanding a wide variety of forest operations while retaining the long-term health of the forest ecosystem as an over-riding objective. Rather than calling for awareness of biodiversity at CFUG level, whose members are well aware of the interdependence of the various components of forest ecosystems, it would be more pertinent to focus on raising awareness and skill levels among the staff of service providers to ensure that technical advice does not conflict with biodiversity objectives.