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A Journal of Forestry Information for Nepal

Forest health: context of forest pests and pathogen in Nepal

Forests form an integral part of life on Earth, and provide a range of benefits at local, national and global levels. In Nepal, forest is an important component of the livelihood of majority of people particularly living in rural areas. Moreover, forests provide several ecosystem services, including provisioning, regulating, supporting and cultural services. Considering such multiple roles of forests, the Government of Nepal has focused on the effective management of forest resources under its various programmes. Government realizes that the continuous supply of multiple goods and services largely depends on the health and conditions of the forests.

Forest health is a very important part of the sustainable forest management system. In the utilitarian approach, it is defined in terms of a forest's capacity to satisfy human needs, whereas the ecological approach considers resilience, recurrence and persistence of a forest and all biological processes involved in. Nevertheless, both approaches are not competing, but are complementary to each other. In essence, they emphasize on sustainable delivery of forest goods and services without deteriorating its quality. However, forests experience plenty of natural and anthropogenic disturbances, such as fire, extreme weather, harsh climate, illegal felling, grazing and encroachment as well as the rampant competition from weeds and invasive/alien species and infestation of various insect pests and pathogens. These disturbances lead to poor forest health, which can exert moderate to devastating negative impacts.

The forest resource assessment of Nepal (2010-2014) collected data related to the extent and severity of various forest disturbances, including grazing, forest fire and tree cutting. However, information related to forest pests and pathogens were not captured. There is a clear gap on comprehensive understanding on the various issues and status of forest pests and pathogens in the national scenario. General observations show that infestation of insect pests and pathogens is a serious problem in Nepal, particularly in plantation and forest nurseries.

A recent field survey by the then Department of Forest Research and Survey (DFRS) and FAO mission in some of the forest sites in the Terai and the mid-hills of Nepal found that both natural and plantation forests have been, in many cases, seriously affected by the infestation of insect pests and pathogens. Seedlings in forest nurseries were also found in feeble condition due to various fungal diseases. Diseased seedlings act as the vectors and are likely to carry pathogens from one place to another and may cause outbreak of diseases in plantation sites in future. Nepal has already witnessed a huge economic loss, though not precisely estimated, due to pathogenic attacks in commercial timber-yielding species like

Dalbergia sissso and Shorea robusta.

Controlling insect pests and pathogens in the forests is a critical task of forest managers; but it requires expertise in many disciplines; such as plant pathology, entomology, ecology, dendrology, mycology, taxonomy, silviculture, and forest management. It is more difficult in natural forests compared to plantation forests. Use of chemicals to control forest insects pests and pathogens is in practice; however, it is limited to forest nurseries or in small forest patches. It is extremely difficult to control them once they spread over a larger area. Therefore, producing insect and pathogen-free robust planting materials is important to keep a forest plantation healthy. The proper consideration on selecting healthy and robust genetic materials may limit the future infestation of insect pests and pathogens on forest crops; ultimately increasing the profits from plantations. In the case of natural forests, controlling insect pests and pathogens before they spread over a larger area is an efficient and effective way to keep them healthy besides implementing various tending and silvicultural operations.

A widely known Nepalese proverb "prevention is better than cure" can be a guiding principle in controlling forest insect pests and pathogens. It is the cheapest and most effective technique to maintain better forest health and conditions ensuring the regular and increased supply of forestry goods and services. Nevertheless, forest health has been one of the most neglected issues in the forestry discourse in Nepal for a long time.

In this context, Nepal requires upgrading the existing laboratory facilities, conducting training programmes for capacity development of the forest technicians, raising awareness among various forest stakeholders, and strengthening capacities of customs and quarantine offices. It is equally important to build strong functional networks of multiple stakeholders at multiple levels in order to stop several insect pests and pathogens entering into the country and conduct various control measures.

Moreover, application of remote sensing technology could be effective in monitoring of forest pests and pathogens. Integrating forest health monitoring as a component of national and local level forest resource assessments and collecting data related to forest insect pests and pathogens could be important. It helps us to know the trend of infestation of forest insects, pests and pathogens in time intervals and also to predict areas susceptible to be infested in the future. Similarly, the mapping and documentation of the extent and magnitude of the infestation followed by action research on prevention and control should be undertaken by the government and other sectors. The results of the action research can be implemented in wider areas at the time of needs

Forests of Nepal, undoubtedly, are infested by insect pests and pathogens. Prevention and control of forest insect pests and pathogens should be a priority program of the government in the forestry sector of Nepal.