PLANTING, A TOOL FOR NATIVE ECOSYSTEM RESTORATION

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Natural Resources Management objectives for Hawaii Volcanoes National Park are to protect and restore native Hawaiian ecosystems. Making progress towards these objectives is a difficult task primarily because of introduced non-native agents competing with or directly destroying native conditions. We are making some headway, however.

The primary tool at the command of the resource manager is "extraction," i.e., the removal or control of non-native elements. Priority is given to those species which are considered to be the most destructive and competitive and for which techniques for control or elimination are feasible. Freeing Park ecosystems of goats, pigs, mongooses, feral cats, and certain exotic plants is the logical course of action where management emphasis has been placed in recent years and where it will probably remain in the future. Unfortunately extraction alone, regardless of how effective, will not counteract over 150 years of disturbance many areas of the Park have sustained. Large areas will continue to be dominated by exotic flora and fauna, and many rare or endangered species will continue to decline.

Besides extraction, the only other significant tool the resource manager has left to pursue established objectives is the reintroduction of appropriate native species, primarily plants, where and when conditions are suitable. Propagating and reintroducing native plants is an integral and vital component of Hawaii Volcanoes National Park's Natural Resources Management Plan and is consistent with National Park Service Management policy which is:

> The reintroduction of native species into parks is encouraged, provided that:
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> --the species being reintroduced most nearly approximates the extirpated subspecies or race;
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> --the species disappeared, or was substantially diminished, because of human-induced change--either directly or indirectly--to the ecosystem.

The planting program is not new at Hawaii Volcanoes National Park. It has been a sporadic activity since the 1920's. Only in recent years, however, has it become a full time operation. Nearly a year ago a modern greenhouse was built here at the

Hawaii Field Research Center. The planting program is in its infancy, relative to its potential to contribute to the restoration and maintenance of native Hawaiian ecosystems. Some of the ways this program is or will be contributing are as follows:

1. Restoration of man-made scars

Following a disturbance such as rerouting the Crater Rim Road at Waldron Ledge an ugly scar has been created. If left alone, natural succession will produce a swath of exotic grasses through which it is unlikely 'ohi'a or other native trees can become established. We are planting this area to advance succession so that the scar will blend into the adjacent terrain.

An ugly scar near the research center was created during the 1930's by bulldozing probably for the purpose of a recreation site for Civilian Conservation Corp. We are now raising 'ohi'a trees which will be transplanted here in an attempt to return this area to a more nearly native condition.

2. Restoration of selected lowland sites following goat removal

Significant changes are taking place in once goat-infested areas. Many areas of the lowland are dominated by exotic shrubs and grasses. Historical accounts and examination of remnant vegetation and natives which have reappeared provide clues to the orginal flora of the area. We are making some experimental plantings of selected areas to see if natives can be reestablished and to what extent succession following goat removal can be influenced to produce a more native flora.

On the slopes of Makahanu Pali several wiliwili trees survived 150 years of goat browsing. As a result of this goat browsing and a 7.2 earthquake in 1975, only one is left representing the last gene pool from this site. We hope to reestablish a population in this area.

Canavalia first appeared inside a goat enclosure at Kukalau'ula and has also come up at Kaone several miles away. We planted Canavalia on the top of Pu'u Kapukapu on a site composed entirely of exotic grasses to see if it will produce a native cover and give competition to the exotic grass.

3. Exotic Plant Control

Much effort and money is spent on trying to control certain aggressive plants. For some, mechanical cutting and/or herbicidal treatment is possible, but for others

this technique is futile. Native plantings could be used to compete with exotic species now that goats are removed and the thorniness or natural herbivorous defenses of many exotic plants do not necessarily give them the advantage.

For example, Lantana is a noxious weed for which the State of Hawaii has introduced many insects for biological control. One technique which we are exploring is the feasibility of removing the problem exotic and immediately replacing it with a native before exotics can reinvade.

4. Preservation and protection of rare and endangered species

Possibly several dozen plants considered to be rare and endangered are not reproducing in the wild. We are hopeful that with the control of goats and pigs they will begin to reproduce. It appears there are other regeneration problems such as exotic grass cover, destruction of seeds by rats, and exotic insects. Therefore, until solutions to these problems are found it is imperative that we continue to propagate and learn as much about these plants as possible so that their survival is ensured.

5. Historical restoration and interpretation

Greenhouse plant propagation can assist reestablishment of the historical scene and reestablish native or Polynesian plants used by early Hawaiians. These are located at archeological sites primarily along the Kalapana coast and are planted out in consultation with the Pacific archeologist and historian.

Plantings are recorded in books maintained at Park Headquarters and at the greenhouse. All the vital information on each planting is recorded and each site is pinpointed on maps. These records are always available for use by other researchers, or other interested persons. Monitoring of plantings is done on a sporadic basis whenever greenhouse personnel have an opportunity to get to the site. Size, condition, and mortality are recorded of a random sample of a given planting. More precise monitoring is planned to be able to follow the effectiveness of the program. As a side benefit of the planting program, an enormous amount of information is being collected and recorded such as location of rare and endangered species, flowering and fruiting times, etc. Insect collections are continuously made which are being identified and mounted by Mr. Cliff Davis. In the greenhouse, germination techniques and a host of other information are being recorded which will contribute to the overall program.

It is understandable that there is concern that the program does, in fact, truly enhance native ecosystems as intended. We fully recognize that there have been mistakes made in the past such as bringing in species which were never suspected of occurring in the Park or planting species outside of their natural range. However with the evolving comprehensive ecosystem restoration plan, rather than just a part time-greenhouse operation as it was a few years ago, errors of this kind should be avoided. A primary safeguard, however, is that the program be open to scientific scrutiny. The present resources management plan list of species to be propagated was compiled through consultation with ecologists, botanists, taxonomists, and other interested persons so species, propagating material source, and planting locations can be evaluated, and input on the desirability of same can be received. It has been suggested that we go even further than this in encouraging scientific input and expertise on the program by developing a discussion group composed of scientists from many disciplines who would meet regularly with Park personnel. This would be a more formal method of receiving advice and suggestions, and we are interested in discussing further the practicability of forming such a group. Another safeguard is to continually keep sight of the goal and to evaluate the impact of any resource management action on the native flora and fauna. It is native ecosystems which continue to decline islandwide. Hawaii Volcanoes National Park is one of the few places in Hawai'i where objectives for ecosystem preservation and restoration are clear and unencumbered by conflicting land use policy. In this Park we have the opportunity to make some lasting headway in native ecosystem preservation and it will be done through ecologically sensitive resource manipulation. The reintroduction of native species is an important tool needed for doing the job.