Chapter 7 : Integrated Pest Management

7.1 Introduction

The number of harmful pests in the world is enormous. A small percentage of them are harmful to human beings and their stored goods. They correspond to several thousands of invertebrate pests like insects and mites, and with several dozen vertebrates like rodents, bats, and birds. All over the world people are fighting these pests but because of the climatic and socio-cultural circumstances the developing countries suffer the most. First of all there are many species that thrive excellently in a tropical climate and secondly there are fewer obstacles to stop them.

A pest infestation can have three major detrimental effects: pests can cause damage to objects, can cause damage to users and can scare users. Organic materials in general are very sensitive to pest infestation. Next to paper and books, natural history collections, previously damaged materials, textiles and ethnographic materials are under the greatest threat (Clareson, 1993).

Insects account for much loss and damage every year and are partly responsible for the slow erosion of our cultural heritage (Pinniger, 1994). No collection is safe from pests! Insects have time on their sides having been in existence much longer than mankind. Therefore they have had more time to develop into the creatures they have become. The benefit of time gives them the ability to adjust to practically every situation. So they grab every opportunity for involvement with natural disasters, changing climates and very poor circumstances. They have the drive and the power to adjust to every situation with a very strong will to survive. Due to the speed with which they multiply they can overtake almost everything. Therefore insects are very strong enemies (Plumbe, 1959b).

Most of the insect species likely to infest paper collections are attracted not by the paper itself but by size, adhesives, and starches, all of which are more easily digested than the cellulose that makes up paper. Some insects will also attack cellulose (i.e., paper and cardboard) and proteins (i.e., parchment and leather). Insect damage does not come solely from eating habits; collections are also damaged by tunnelling and nesting activities, and by bodily secretions (Lindblom Patkus, 1999).

Mould, another notorious archive peril, has developed a perfect symbiosis with nature and objects made of natural materials. Whatever the climatic circumstances the spores can survive: hot or cold, wet or dry. This ability to exist on almost any material characterizes microorganisms as primary agents of deterioration. They are simple-celled organisms that do not need energy from light for growth. The microscopic spores are produced in enormous quantities, are always present in the air, and spread via air currents. They are often water repellent and are resistant to desiccation (drying out). Micro organisms, like fungi, will damage the materials supporting them permanently; they will leave stains and decrease strength. The scattered spots known as foxing on paper prints or drawings is damage resulting from these growths. Only extreme cold and heat will destroy them (National Park Service, 1993).

Rodents can be another nuisance in archives, libraries and museums. They are relatively small, gnawing animals that belong to the vertebrate species, being an animal with a backbone or spinal column. A few, such as rats and mice, are common pests in urban and industrial sites. There are many other rodent species that can be considered pests in certain regions of the world or in certain instances. However, although they may occasionally become severe pests, none have the global distribution of the house mouse, the Norway rat and the roof rat (Rentokil website).

A variety of rodents attack binding materials, adhesives, and other substances in library and archival collections. Since some of them are attracted to the confined, dark places that abound in storage areas, and since many materials are handled infrequently, rodents may do significant damage before they are discovered (Lindblom Patkus, 1999). Archive materials may be eaten, soiled, stained and shredded (Brandt-Grau, 2000). Typical evidence of rodent damage in repositories is the teeth marks left in leather and vellum bindings. More will be lost due to contamination with droppings, urine or gnawing damage. The most serious risk is that their close association exposes man to many harmful diseases, some of which can be severe or even fatal (Rentokil website).

7.1.1 The Old Way

In previous centuries people always fought pests and developed a wide variety of solutions and eradication techniques. In a number of instances these provided only partial solutions, some were only effective for a short time and others were extremely poisonous to both man and his surroundings.

The enormous developments made in chemistry has given new powers to man’s armament of protection of himself and his cultural properties against the ravages of insect pests. Even now commercials encourage the public to fear pests (those creepy crawly things) and look to the eliminator (a robo-pest terminator) for
immediate, simple, and effective control. Each year millions of dollars are spent on over-the-counter products, professional services, and restricted use pesticides. And yet we still have pests. In fact, some experts suggest that we are doing little other than creating super-pests, with increasing resistance to more and more pesticides (Chicora, 1994).

Libraries and archives have traditionally relied on pesticides for routine pest prevention and response to observed infestation. Pesticides often do not prevent infestation, however, and application of them after the fact cannot correct the damage already done (Lindblom Patkus, 1999). Since ethylene oxide fell from favour at the end of the 1980s, there has been no fumigant suitable for use in libraries and archives that could control both microorganisms and insects. Thymol fumigation to control mould has been shown to do more harm than good, in the long run. The search for non-toxic substitutes for ethylene oxide, thymol and other familiar fumigants has continued at an accelerated pace since then, with some success (McCradey, 1991).

Environmental and health concerns have caused a radical change in the popular perception of chemical pest control methods. Governmental and environmental agencies seek to further limit the uses of chemicals in areas that have, till now, accepted them as routine treatments (Nicholson et al., 1996). Not only can pesticides pose health hazards to staff but they can actually damage the paper-based collections themselves too. The simple truth is that we need to change our way of dealing with pest problems. We need to use fewer chemicals, make sure the ones we do use are appropriate and that their application is correct, and select the least toxic of the various pesticides available. At the same time we need to pursue mechanical and cultural changes which build or starve pests out more aggressively, making museums, libraries, archives, and historic sites less attractive to things that destroy collections (Chicora, 1994).

7.1.2 The New Way
In the early 1980s, a number of trends emerged in museum pest management. While the conservators remained concerned about the damage that the creatures were doing to the collections, they started becoming equally concerned about the damage that pesticides might do to the historic materials. Also they became increasingly worried about the effect that toxic materials might have on health. Professionals started looking for a way to protect the collections against the pests, while minimizing exposure to toxic materials. Soon they stumbled on Integrated Pest Management (IPM), originally developed for the agricultural and urban pest management communities, and introduced the concept to archives, libraries and museums (Jessup, 2001).

The days that scores of institutions had a contract for monthly spraying should be over by now. The pest control operator came in like clockwork and sprayed here and there. The conservator relied entirely on the commercial company and on the operator (Chicora, 1994). Ten years after its introduction in conservation the emphasis in pest control had become totally on IPM (McCradey, 1991). The IPM approach relies primarily on non-chemical means (such as controlling climate, food sources, and building entry points) to prevent and manage pest infestation. Chemical treatments are used only in a crisis situation threatening rapid losses or when pests fail to succumb to more conservative methods (Lindblom Patkus, 1999).

Today IPM is the preferred method and many pest control firms are offering IPM services, although what they are sometimes offering is little more than the same old techniques, repackage d to give them glitz. A true IPM programme will concentrate on the least toxic approaches to pest control by integrating a variety of mechanical, cultural, biological, and (as a last resort) chemical controls (Chicora, 1994).

It is impossible to give a ready-to-use solution to any pest problem. The IPM approach depends on the local circumstances. Some of these circumstances are (Jessup, 2001):
• the climate;
• the conditions in the repositories;
• the surrounding;
• the kind of pests.

Modern preservation professionals recommend Integrated Pest Management and in most situations where IPM has been implemented, both pesticide use and pest problems have decreased dramatically (Mitchell, n.d.).