HEALTH FOR ALL BY THE YEAR 2000

In 1977, the World Health Assembly decided that the main social target of the governments and of WHO should be the attainment by all people of the world by the year 2000 of a level of health that would permit them to lead a socially and economically productive life, that is, the goal popularly known as "health for all by the year 2000."

In 1978 the International Conference on Primary Health Care (Alma-Ata, USSR) declared that, as a central function of the national health system and an integral part of economic and social development, primary health care was the key to achieving that goal. Subsequently, the governments committed themselves—at the global level at the World Health Assembly, and at the regional level at meetings of the PAHO Governing Bodies—to implement the resolutions adopted for attaining health for all. In the Americas the high point of these mandates was reached on 28 September 1981 when the Directing Council of PAHO approved the Plan of Action for implementing the regional strategies for health for all by the year 2000. These strategies had been approved by the Directing Council in 1980 (Resolution XX) and today constitute the basis of PAHO's policy and programming, and represent in addition the contribution of the Region of the Americas to the global strategies of WHO.

The Plan of Action approved by the Directing Council contains the minimum goals and regional objectives, as well as the actions governments of the Americas and the Organization must take in order to attain health for all. The Plan, continental in nature, is essentially dynamic and is addressed not only to current problems but also to those likely to arise from the application of the strategies and the fulfillment of regional goals and objectives It also defines priority areas that will serve as a basis, in developing the program and the necessary infrastructure, for national and international action.

The exchange and dissemination of information constitutes one of the priority areas of the Plan of Action. PAHO's publication program—including periodicals, scientific publications, and official documents—is designed as a means of promoting the ideas contained in the Plan by disseminating data on policies, strategies, international cooperation programs, and progress achieved in collaboration with countries of the Americas in the process of attaining health for all by the year 2000.

Emergency Vector Control after Natural Disaster

1982 Scientific Publication No. 419

PAN AMERICAN HEALTH ORGANIZATION
Pan American Sanitary Bureau, Regional Office of the
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Published also in Spanish (1982) as:
Control de vectores
con posterioridad a los desastres naturales

The publication of this manual, in English and Spanish, has been made possible by financial support of the Canadian International Development Agency (CIDA) and the U.S. Office of Foreign Disaster Assistance of the U.S. Agency for International Development (AID/OFDA).

ISBN 92 75 11419 6

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Foreword

Most Latin American countries are highly vulnerable to natural disasters (earthquakes, hurricanes, floods, etc.). The consequences are immediate in terms of loss of lives and suffering. Longer term consequences can include serious setbacks in national development plans.

The impact of past disasters has been enormous: Nicaragua, 1972, 5,000 deaths; Honduras, 1974, 6,000 deaths; Guatemala, 1976, 26,000 deaths. In Peru alone, the 1970 earthquake caused 70,000 deaths and approximately 170,000 casualties.

The Caribbean area is also vulnerable to natural disasters, such as hurricanes. Barbados was hit in 1955, Haiti in 1964, Dominica and the Dominican Republic in 1979, Saint Lucia, Haiti and Jamaica in 1980. Earthquakes have also occurred in Trinidad and Tobago, Jamaica and Antigua. Floods and landslides affect most of the islands. The disruption caused by natural disasters is magnified by the physical isolation of each country and the fact that, in most cases, the impact extended over the entire nation.

Disaster preparedness is a significant part of the overall strategy for achieving Health for All by the Year 2000. There is probably no event that so severely tests the adequacy of a nation's health infrastructure as the occurrence of a sudden natural disaster such as an earthquake, hurricane or flood. Especially in smaller developing countries, economic progress can also be jeopardized.

To a large extent, a solid, well-planned health delivery system that routinely includes the educated participation of the community is the most important preparation for a natural catastrophe. However, rapid recovery from large-scale natural disasters requires that special preparations and procedures be in place well before the disaster occurs. By definition, a disaster of large magnitude is one that overwhelms a community's normal response capacity.

The series of manuals on disaster preparedness issued by the Pan American Health Organization is designed to respond to the call from Member Countries to "disseminate the appropriate guidelines and manuals" so as to assist health workers in the Americas in developing disaster preparedness plans and training the necessary human resources. Given the suddenness of their occurrence and the importance of speedy measures to prevent potential morbidity and mortality, natural disasters demand that a nation use appropriate technology and its own human resources during the immediate emergency. Dependence on outside resources can create a time lag that may have serious consequences for the health and well-being of the affected population.

This manual is a companion piece to the guide *Emergency Health Management after Natural Disaster* (PAHO Sci. Pub. No. 407, 1981), and provides technical guidelines on specific chapters contained in the parent guide. The parent guide provides an overview intended to be of use to policy makers and the administrators responsible for health service delivery after the occurrence of disaster in developing nations. This manual is directed to an audience which consists of the senior technical officers involved in postdisaster health relief. Given the importance of intersectoral collaboration for effective relief efforts, the manual also provides guidelines for such cooperation.

The general principles and observations in this manual are relevant throughout the developing world. Special emphasis is, however, given to the experiences and needs of Latin America and the Caribbean. It is hoped that the manual will serve as a framework for developing national manuals, adapted to local circumstances, and that disaster preparedness will become an integrated component of national plans of action toward Health for All by the Year 2000.

Héctor R. Acuña, M.D., M.P.H.
Director

Acknowledgment

Pan American Health Organization consultants, working in the Caribbean after Hurricane David in 1979, identified the need for guidelines concerning problems related to vector-borne disease after natural disaster. This guide was prepared in response to that need. It was written for countries that might be affected by natural disasters in order to alert them of potential vector related problems and their possible solutions, and to provide guidelines for consultants assigned to countries for postdisaster assessments.

This guide was also written for individuals with a broad range of backgrounds, from that of health administration to that of vector control inspection. Certain subjects may not be discussed in sufficient detail to provide answers for all technical decisions to be made. Therefore, this information should be supplemented through additional reading of the references listed in the bibliography.

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Introduction

This guide is intended to assist governments confronted with the problems related to vectors and pests that follow certain natural disasters. It will also be of value to evaluation teams asked to determine the probability of vector-borne disease related emergencies. The specific objectives of this guide are:

(1) To call attention to the vector, rodent, pest and related problems that may occur after a natural disaster
(2) To provide technical information necessary for evaluating the need for vector and rodent control following natural disaster
(3) To provide technical information for initiating immediate and post-disaster control measures
(4) To serve as a basis for the formulation of national and international training programs for the evaluation and control of vector-borne disease after natural disaster
(5) To provide guidelines for planning and carrying out surveillance and control programs under austere conditions.

Since every natural disaster has some unique characteristics, no guide can completely cover every situation. Individual judgment, fortified by knowledge of the environmental, public health, political and economic conditions of the affected area, will provide the real guidance for evaluating problems and finding adequate and acceptable solutions. This guide provides information about specific problems related to vectors and contains suggestions for solving them.

Part I

An Overview

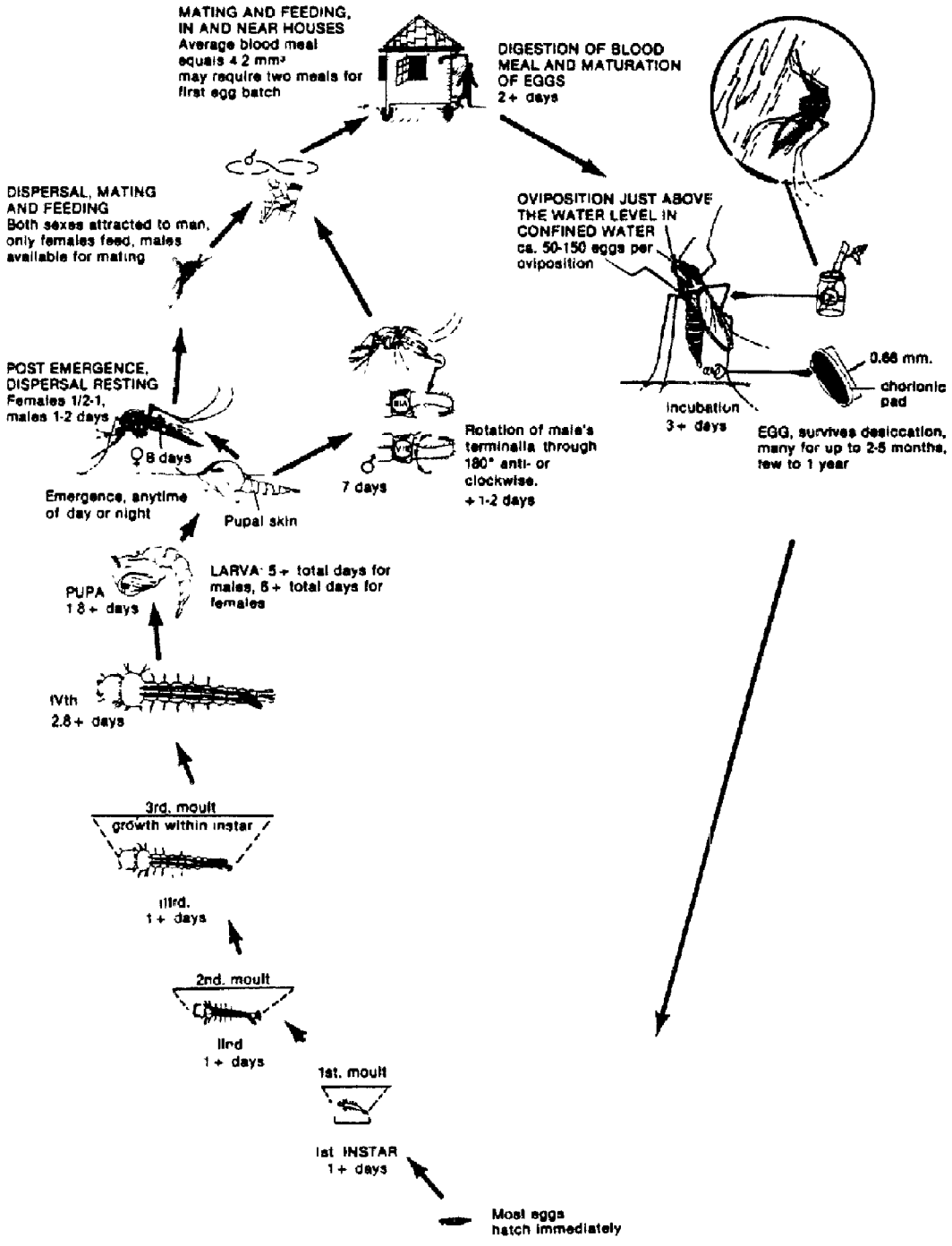
Chapter 1

The General Problem

Although there are a number of types of natural disasters, the scope of this guide will be limited to those of hurricanes, cyclones, floods, earthquakes and volcanic eruptions. In each case, the rapidly changing environment produces a general disruption of patterns of life, which results in stress to individuals and the weakening of health throughout the population. In many instances, people are forced into crowded, unsanitary conditions which can lead to outbreaks of epidemic diseases.

For the public health administrator, sanitarian, entomologist, epidemiologist and vector control specialist, the management of health relief and related responsibilities involves careful planning. Certain natural disasters may provide sufficient warning that some of their consequences can be alleviated. Predisaster planning, consisting of the establishment of disaster readiness committees and the formulation of contingency plans, can limit the risk. This is accomplished through organized preparedness, including the assignment of responsibilities to specific individuals and the establishment of intergovernmental relationships through which better use is made of any existing resources. Contingency planning should, however, be broad enough in scope to allow the response to be flexible. Too much detail may be counterproductive and self-defeating. Certain guides cited in the bibliography provide administrative procedures for planning and organizing public health activities during and following disasters.

The majority of vector control programs have static, inflexible administrative procedures. Consequently, there is a tendency to respond routinely to disaster situations, even when they call for innovation and flexibility. A disaster contingency plan may alleviate some, but not all of this problem. As a result, there may be some misdirection, confusion and waste, regardless of how well organized and adaptable the program is. Overreaction to actual and potential risks of vector-borne disease may occur because of our inevitable inability



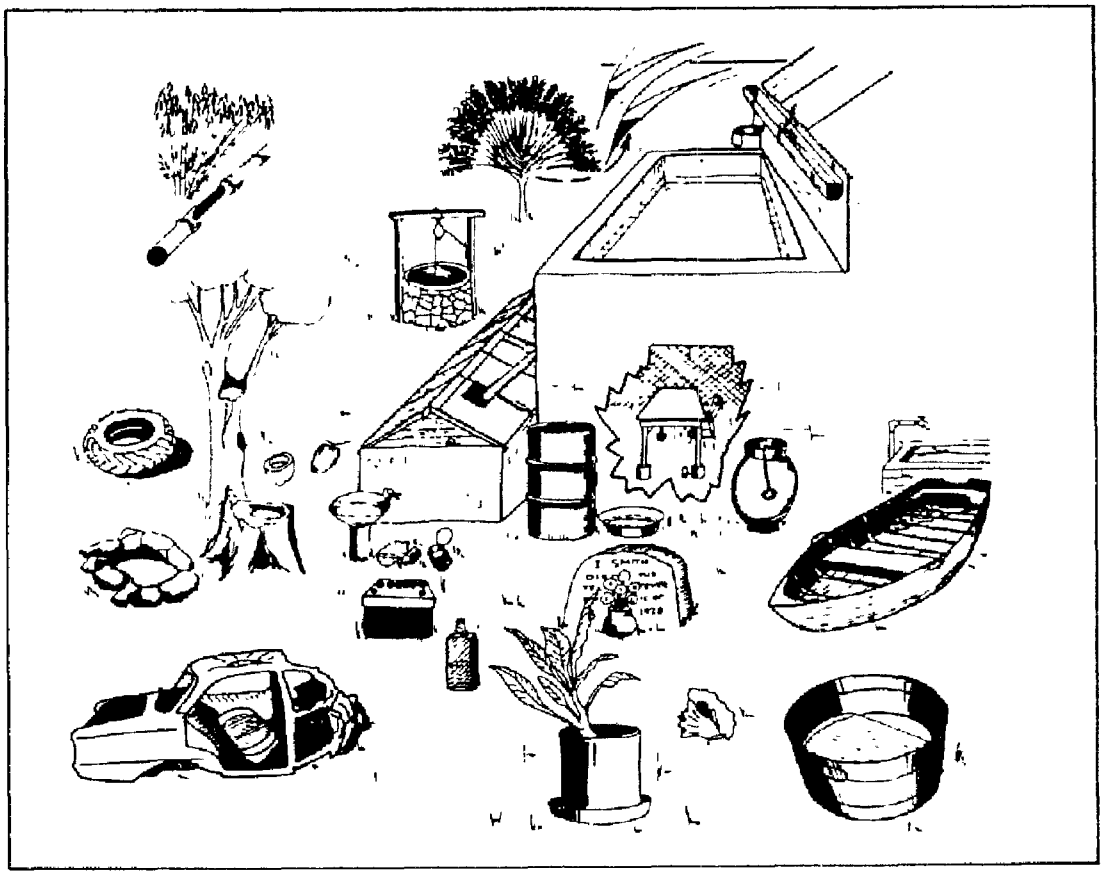
Courtesy Dr. M Giglioli, Cayman Islands

The life history of *Aedes aegypti*.

to predict the actual future needs. That this is inevitable should be recognized in determining the availability of resources and the most effective use that may be made of them. In many cases the confusion and overreaction that takes place in the aftermath of a natural disaster will be partially offset by the visibility of entomology and rodent evaluation and control teams, whose presence may benefit the population psychologically.

Disasters do not generate "new" diseases but, by altering the environment, they may increase transmission of diseases that already exist in a region through:

(1) Direct effect of the physical event itself, such as fecal contamination
(2) Indirect effects which result in such conditions as overcrowding and poor sanitation
(3) Promoting or causing increase in the movement of populations
(4) Disrupting routine vector control programs
(5) Altering the distribution vector species.



Courtesy Dr M Giglioli, Cayman Islands

***Aedes aegypti* breeding sites.**

The increased risk of transmission of vector-borne disease must be seriously considered after all natural disasters. It is a matter of priority, therefore, that the potential of transmission of vector-borne disease is assessed early in the postdisaster period. It is important to note, however, that natural disasters do not necessarily lead to outbreaks of infectious diseases. This is particularly true of the mosquito-borne diseases, since the larval habitats and adult resting sites of mosquitoes often suffer from wind and water damage. As a result, such diseases as malaria, dengue and encephalitis may not appear until several weeks after the disaster, if they appear at all.

Chapter 2

Disaster Preparedness

A Disaster Emergency Committee, with responsibility for maintaining a state of preparedness for natural disasters, should be in existence. Such a committee would include representatives from governmental and private agencies that deal with the routine problems that are accentuated in times of disaster. A Vector Control Subcommittee should be established in the health sector, and it should be responsible for updating information concerning the status and distribution of the vector-borne diseases that are endemic to the country, as well as nearby regions. Information should be continually updated on entomological surveillance of vector populations and on the location and status of manpower, insecticides and application equipment. The subcommittee should be responsible for implementing the emergency vector control operations. To accomplish this, it must have power to act without the bureaucratic constraints that are usual in normal circumstances. The subcommittee may include individuals from a number of agencies within the Ministry of Health, as well as those from other ministries and the private sector. The chairperson of such a committee may be the officer responsible for epidemiology, for malariology or for environmental health.

In areas of high risk of recurrent natural disasters, vector control personnel should attempt to rehearse disaster emergency control operations, in order to refine procedures and develop expertise and a more effective state of alertness. Even without a Vector Control Subcommittee, insect and rodent control personnel can develop a system of alertness to function during and after disasters. Continuous in-service training of all members of the staff should be included in all control programs. Training and program evaluation services offered by the Pan American Health Organization can assist administrators in identifying and resolving problems in control programs.

The vector control program should keep information current on the following:

(1) The status of all instruments, aids and activities necessary for surveillance, evaluation, and control activities, including:
   (a) Distribution maps of areas of high risk of disease transmission, which delineate the sizes of vector populations, increases in larval breeding sites and the locations of potential reservoirs of disease
   (b) The distribution of all cases of malaria of autochthonous and foreign origin
   (c) Maps of the phases of progress in malaria and *Aedes aegypti* control programs
   (d) Population indices for *Aedes aegypti*, malaria vectors and other important species
   (e) Graphs of monthly variation in vector density per year and according to changes in rainfall and temperature
   (f) Graphs showing changes in the incidence of vector-borne and rodent-borne diseases
   (g) Status of seaport and airport *Aedes aegypti* and rodent surveillance programs.

(2) The inventories of insecticides and vehicles and other types of equipment, and lists of personnel and variable funds, including
   (a) Breakdowns for each vector and rodent control program
   (b) A list of similar or related programs that exist in other ministries, such as Agriculture and Defense, and an inventory of their equipment and insecticides that can be converted to public health use
   (c) A list of private fumigation and agricultural spray companies that have ultra-low volume (ULV) and other application equipment (which might be owned by resorts or cities in touristed areas)
   (d) A list of the names, telephone numbers and addresses of contacts in the Ministry of Health and other ministries and, in addition, of companies that supply and manufacture insecticides and dispersal equipment, and of international representatives
   (e) A list of any other known, local sources of expertise, supplies and material.

(3) The status of transportation, communication and intelligence, and other maps and reports that might assist in reconnaissance and other types of surveys, including:
   (a) Road maps of larger political divisions and street maps of cities and towns

(b) Geographical and topographical maps
(c) Aerial photography surveys of high risk areas of vector-borne diseases
(d) Distribution maps of agricultural products
(e) Telephone directories, airline schedules and ham radio operators, and radio, television and newspaper services

(4) Directions for routing requests for interdepartmental and international aid, and a list of agencies.

(5) An operational contingency plan.

Chapter 3

Postdisaster Action

Immediate Action

One of the first actions of the subcommittee should be to assess the potential of vector and rodent related problems, and to gather adequate baseline information. Vector and rodent control personnel should be consulted about the locations of temporary living quarters, so that human contact with these organisms is minimized. Vector and rodent control personnel, and sanitarians, can also provide advice about mosquito and rodent proofing of temporary structures. It is also necessary at this time to determine if the available staff members, insecticide resources and equipment are adequate. If not, appropriate measures should be taken.

Assessment of Situation

A significant problem that administrators of vector control face after natural disasters is accurately assessing the potential of vector and rodent related problems, and determining what resources are required. A considerable amount of unreliable information concerning the vector problem may be generated from other than official sources. In most cases, it will be exaggerated and panic may result in the population. Accurate and updated information collected before a disaster facilitates the proper evaluation of the postdisaster situation and it aids in the process of making logical decisions concerning a plan of action. Such information also helps in providing international relief agencies a clear picture of the problems a disaster can pose. It permits them to reach a clearer definition of their role in relieving shortages of insecticides, rodenticides and equipment. Adequate information from the predisaster period also improves the accuracy of the information that is given to government information services and the local population.

Each of the different types of natural disasters causes specific kinds of vector and rodent related problems, and the periods of time in which they remain problematic varies. This is particularly true of water related disasters that create breeding habitats. Certain types of information, which may be broken down according to type of disaster, are generally required in the postdisaster period. After all disasters, it is necessary to do the following:

(1) Determine the geographical area and the size and distribution of the population affected, and the political and medical zones involved
(2) Assess the extent of damage to transportation and communication systems
(3) Determine the availability of staff, the availability and condition of equipment and supplies in the affected area, and the availability of additional resources in unaffected areas
(4) Review the current information on the vector and rodent situation, including population densities in the affected area and the prevalence of vector and rodent related diseases in affected and adjacent areas.

After the specific occurrence of water related disasters, such as hurricanes, cyclones and floods, the following steps need to be taken:

(1) Determine all migrations and redistributions of human populations within and adjacent to the affected area
(2) Assess the extent of damage to the water supply system and sanitary facilities, and estimate the time required to restore these services
(3) Appraise the crowding and exposure to mosquitoes and other vectors in postdisaster living situations, and the rodent-ectoparasite contact and fly breeding as they relate to the living situations
(4) Determine the status of established mosquito breeding habitats and the extent to which new ones are created
(5) Work with epidemiologists and other health officials to reestablish the disease surveillance network and the role of the vector control programs within the network.

When earthquakes and volcanic eruptions occur, these steps should be followed:

(1) Determine population movements and the need for shelter, water and sanitation
(2) Assess the risk of vector and rodent-borne diseases
(3) Determine the need for vector control when there is emergency provision of water and sanitation in the area.

Aerial observation, where available, is one of the easiest methods of obtaining information on the geographical extent of damage to population centers and communication and transportation systems. It is useful, as well, for assessing vector breeding potential and human population movements. Light, single and multi-engine aircraft and helicopters may be available from the military and private sectors or from commercial agricultural aerial spray companies. Funds for aerial surveillance should be allocated in any budget. Maps and, if available, recent aerial photographs can be used for comparative purposes when the situation is assessed.

Additional information may be obtained from on-site reports from vector control staff members who live or work in the area and from local public health inspectors, physicians, administrators and teachers. Some caution should prevail, however, when interpreting information from these sources

Determining Priorities of Action

Knowledge of the biology and ecology of pest organisms and their relevance to the current conditions is required when the effect that natural disaster damage has on vector and rodent problems is assessed. For example, flooding usually flushes out or destroys mosquito breeding sites. It subsequently creates additional habitats that can eventually produce even greater mosquito densities. When water and sewage systems are damaged, increased storage of potable water can provide additional breeding sites for *Aedes aegypti* while temporary pit latrines can provide habitats for synanthropic flies and *Culex quinquefasciatus*. Inadequate food storage, poor sanitation, and contamination by debris, animal carcasses and excreta may produce filth flies and increase the visibility of the rodent populations.

Problems related to vectors and rodents may not be confined to the affected region. Human movement away from the region may contribute to crowding in peripheral areas and, as a result, provide opportunity for proliferation of diseases associated with vectors and rodents. Following water related disasters, the peripheral areas may harbor potential mosquito breeding habitats that are more conducive as immediate oviposition sites than in the actual disaster area.

When setting priorities, types of vector-borne diseases in the area and density of the human population are factors to consider. When these are known, action should be immediately directed toward the areas of high population density, especially slum areas and camps where migrant populations are received Every attempt should be made to restore and strengthen routine vector control operations within the area

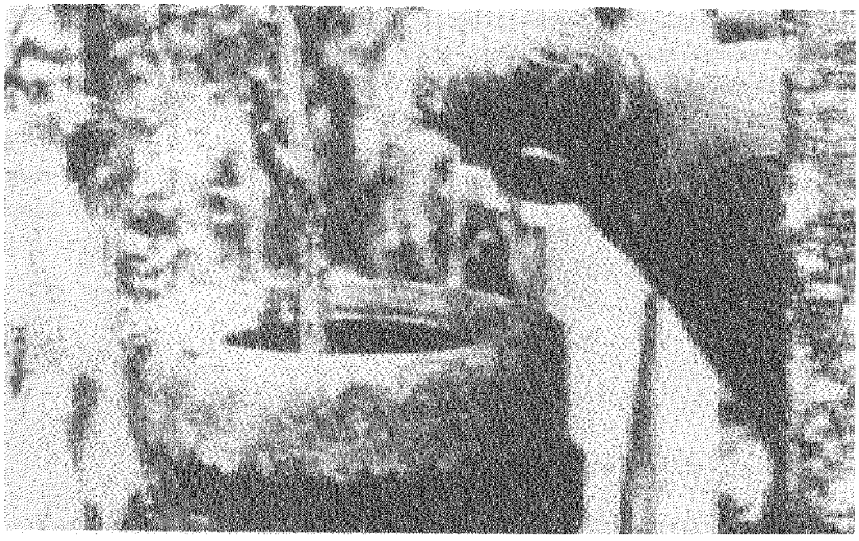


Photo courtesy L. Scholdt

Cisterns, cans, bottles, cemetery urns, tires and almost any discarded container that holds fresh water may become a vector breeding site.

Under certain circumstances, the Ministry of Defense may be called upon to render aid in the wake of a natural disaster. Probably no other organization is so uniquely endowed with the necessary resources such as manpower and transportation, and possesses the necessary capability of quick reaction.

Urban, suburban, and rural areas of high priority for receiving control efforts should be determined from the following criteria:

(1) Population at risk
(2) Number of confirmed or suspected disease outbreaks
(3) Recent history or disease transmission
(4) Relative density of potential disease vectors
(5) Significant increases in new breeding sites
(6) Significant wind damage resulting in destruction of sprayed houses and increased exposure of displaced or homeless persons to mosquitoes
(7) Presence of potential disease reservoirs
(8) Seasonal accessibility by ground transport
(9) Number and types of complaint calls regarding mosquito activity.

Surveillance and Control

The major activities in vector and rodent control occur during the postdisaster period. If the immediate surveys and other sources of information indicate a potential problem, the sooner that postdisaster programs are implemented to reduce the disease potential, the less is the chance that epidemics will occur and the less is the overall expense to the government. Delaying action until an epidemic is at its height can be medically and economically disastrous.

Reestablishing and upgrading routine control operations, surveillance activities and training of staff members will go far in lessening the chance and/or impact of an arthropod-borne epidemic. Operational manuals for control of malaria and *Aedes aegypti* caused diseases prepared by the World Health Organization and the Pan American Health Organization can assist in planning these activities.

Emergency Action in the Event of a Vector-Borne Disease Outbreak

Should the immediate action to bring vector populations under control prove insufficient, and a vector-borne disease outbreak result, all efforts should be made to reduce infective adult mosquito populations as soon as possible, by such space spray methods as aerial ultra-low volume (ULV) applications, vehicle-mounted and portable thermal foggers, aerosol generators or portable mist ultra-low volume blowers. Details about these methods are given in Part II. under "Specific Vector Problems."

Chapter 4

Vector and Rodent Related Diseases

Mosquito-borne diseases, especially malaria, dengue and arboviral encephalitis, cause significant concern after disasters with which heavy rains and flooding are associated. The *immediate* effect is, however, the probable destruction of larval habitats and some accompanying reduction of the vector population with the secondary creation of new larval habitats. It is difficult to determine the probability that greater adult densities will be produced in these habitats and, subsequently, whether an increase in disease transmission will occur.

Such vector related diseases as endemic typhus and certain rickettsial diseases, should cause concern when they are already endemic in or near a disaster area. In addition, fly, cockroach, bedbug, human louse and rodent infestations may pose problems. Immediately after a natural disaster, the fly and rodent densities may appear to be greater, either because they become more visible or have indeed rapidly increased. This is partly due to disruption of sanitary services, such as garbage collection and disposal, and also because increased human crowding is accompanied by increases in the densities of populations of rodents and other vermin which seek the same sources of food and accommodation.

In some regions of the world, unsanitary and crowded temporary shelters and inadequate facilities for storing food provide ideal habitats for bedbugs, lice, fleas, mites, mosquitoes and rodents. Under conditions of this sort, the possibility of transmission of diseases such as louse-borne epidemic typhus, plague and malaria is enhanced.

The potential for increase of vector-borne disease occurrence and related problems during a postdisaster period is summarized on the next page. The immediate period is one to seven days after impact. The "delayed" effects refer to those that occur during the next 30 days or more.

The following sections will cover the issues of identification, evaluation and control of specific problems. The reader interested in routine control operations related to specific diseases, should consult the bibliography.

Vector	Immediate	Delayed
Filth flies	annoyance	diarrhea, dysentery, conjunctivitis, typhoid, cholera, fly larvae infestation, annoyance
Mosquitoes	bites and annoyance	encephalitis, malaria, yellow fever (urban), dengue, filariasis, annoyances and bites
Rodents	rat bites	rat bite fever, leptospirosis, salmonellosis, rat bites
Lice	bites and annoyance	epidemic typhus, louse-borne relapsing fever, trench fever, bites and annoyance
Fleas	bites and annoyance	plague, endemic typhus, bites and annoyance
Mites	bites and annoyance	scabies, rickettsial pox, scrub typhus, bites and annoyance
Ticks	bites and annoyance	tick paralysis, tick-borne relapsing fever, Rocky Mountain Spotted Fever, tularemia, bites and annoyance
Bedbugs, Kissing bugs	bites and annoyance	bites and annoyance Chagas' disease
Ants, spiders, scorpions, snakes	envenomization, bites and annoyance	envenomization, bites and snakes, bites and annoyance

[1]From 1-7 days

[2]30 days or more