

THE ROLE OF INDONESIAN ENVIRONMENTAL HEALTH MANAGEMENT  
AND VECTOR CONTROL IN SEVERAL NATURAL DISASTERS  
(Some experiences in Indonesia)

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I. INTRODUCTION

Every year Indonesia suffers from disasters of one kind or another, of which the degree of losses and damages varies greatly. Being the world's largest archipelago consisting of about 13,000 islands, Indonesia is subject to potentially destructive natural phenomena that is more frequent and varied than in most other countries. The principle hazards are earthquakes, volcano eruption (128 active, of which 70 classified as dangerous) landslides, floods, storms, droughts, fires, and agricultural pests and diseases. Records have shown that during the Nation's Third Development Plan period (REPELITA III, 1979-1984), there was an average of 2,813 significantly destructive events annually, with an average of 1000 deaths, 5000 injured, 100,000 homeless, and 1,000,000 hectares of agricultural land destroyed. Total direct costs due to these damages was estimated to be approximately Rp. 125 billion annually (about US\$ 76.0 million).

Natural disasters usually disturb the environment and induce adverse effects to public health by an large. Environmental Health management in disasters is therefore measures undertaken to minimize and control the deteriorating conditions and situation inter-related between the environment and people to such a level that they poses no public health hazards. In this context, measures undertaken to always maintain a good state of preparedness before, during and after disaster are of utmost importance.

The Directorate General of Communicable Diseases Control and Environmental Health, Department of Health, is the Government agencies responsible for the disaster preparedness and Environmental Health Management aspects through its Environmental Health programme.

II. SCOPE OF ENVIRONMENTAL HEALTH

Environmental health is defined as the prevention and control of those factors in the environment that may have adverse effects on people's physical, mental, or social well-being. By this definition the scope of environmental health is vast in nature including following aspects:

1. Water supply and water quality control.
2. Excreta disposal.
3. Liquid and solid waste disposal.
4. Vector control.
5. Housing improvement.
6. Public places hygiene and sanitation.
7. Occupational health.
8. Food hygiene and sanitation.

9. Environmental pollution control.
10. Radiation control.
11. Prevention of accident.
12. Specific environmental control on epidemic, disaster and pilgrims.
13. Other preventive measures to control the environment in order to reduce health risks.

In the occurings of natural disaster, the physical environments are disrupted and changes may take place. Consequently, people are subject to exposure to the unhealthy conditions of the environment which may be harmful to health. Disaster actions related to environmental health needed to be immediately undertaken include the following:

- Provision of suitable shelters that do not cause environmental health problems and disturb general public services.
- Provision of minimum requirement of safe drinking water supply.
- Provision of refuse disposal sites.
- Provision of sullage disposal facilities.
- Prevention and control of vectors to a level that is not harmful to health.
- Food sanitation inspection to ensure that the foods provided are safe and do not contribute to the spread of disease.
- Personal and household hygiene and health education to promote healthful living.

The Environmental Health management team must be well prepared and ready to handle any disaster at all times. Proper judgements and quick decisions to undertake measures in bringing the disaster situation under control are crucial. High-level decision makers therefore must be well-experienced in disaster undertakings and given accurate information on the event immediately. Mobilizing community to participate in all activities during and after disaster is another very important aspect in Environmental Health disaster management.

### III. ENVIRONMENTAL HEALTH ORGANIZATIONAL STRUCTURE

In health sector, at central level, the Directorate General of Communicable Disease Control and Environmental Health, Department of Health is responsible for the development and implementation of environmental health programme.

At provincial level (all provinces), there are two units responsible for environmental health activities. One is the Environmental Health and Health Education Section which is under the Provincial Health Department (KANWIL-DEPKES). KANWIL DEPKES is responsible to the Central Health Department. The other is the Environmental Health Promotion section under the local Government Health Services (DINKES). In the political structural framework, Local Governments belong to Home Affairs Department.

At kabupaten (regency) level (all kabupatens and municipals), under the Local Government Health Service, there is also a Section of Environmental Health Promotion. Then at kecamatan (sub-district) level, under PUSKESMAS (Health Centre, about 5,150) one or more health personnel are appointed to be in charge of Environmental Health activities. They are Sanitarians or Environmental Health Personnel. However, not all Health Centres have Sanitarian, particularly in the remote areas.

When disaster taking place, responsible agencies at all levels are involved in the tasks depending on the degree of the disaster. The Kecamatan and Kabupaten offices are normally the first units to take action. In areas where Environmental Health Personnel are not available, offices concerned at will coordinate the higher level activities requesting assistance from nearby Health Services offices to undertake the tasks until situations are back to normal.

#### IV. ENVIRONMENTAL HEALTH MANAGEMENT BEFORE AND AFTER DISASTER

Environmental Health programmes have been given priority in Health Sector since the Nation's first Five-Year Development Plan in 1969 upto the present Fourth Five-Year Plan as well as in the forthcoming Fifth Five-Year Plan. At Global level, the importance of Environmental Health was underlined by an extraordinary session of the United Nations General Assembly, which in 1980 declared the decade ending in 1990 as the International Drinking Water Supply and Sanitation Decade. Indonesia has committed itself in this declaration and implementing the National Decade programme through the sector's Five-Year Development Plan.

This Decade programme can actually be considered as the "preparedness" in disaster" as the objectives of the programme among others are to improve the quality of living environment and to develop selfhelp attitudes and community participation in the development of Environmental Health.

In general, approaches in the development of Environmental Health Programme under normal situation may be grouped as follows:

- a. Education:
  - Construction of excreta and sullage disposal facilities for "demonstration" purposes to be multiplied by the community on self-help basis.
  - Environmental Health Education and Training including personal hygiene, food hygiene and sanitation, housing, pesticide safety etc.
- b. Financial and technical assistance for:
  - water supply schemes,
  - vector control, particularly at refuse disposal sites,
  - By-laws preparation, etc.
- c. Law enforcement:
  - public places sanitation.
  - industrial sanitation, etc.
- d. Control of the Environmental quality:
  - monitoring (speculative).

Approaches in carrying out Environmental Health activities in events of disaster also fall in same lines with above with the exceptions that during disaster activities are carried out in a packaged and speedy manner under emergency situation.

## V. DISASTER ACTIONS IN ENVIRONMENTAL HEALTH

A time-phased plan for post-disaster implementation in Environmental Health can be adopted only on an arbitrary basis as the phenomena may vary greatly from case to case. As a whole, the implementation may proceed along these lines:

### Phase 1 (Roughly first 24 hours)

- Main task
- i) Assessment of : - the general situation and extent of environmental health problems;  
- the requirement for manpower and services,  
- the requirement for equipment, supplies and material etc.
  
  - ii) Information on : - to Puskesmas  
Assessment - to Kecamatan office,  
Results - to Kabupaten level offices and the  
Coordination Board (SATKORLAK),  
- to Provincial Health Office,  
- to head office of the Department of Health.
  
  - iii) Coordination : - local authorities,  
with - other Government departments,  
- other related health services.
  
  - iv) Action on : - water supplies,  
- food supplies,  
- disposal of the deads,  
- survey of destroyed areas,  
- communication,  
- advise to people of environmental health measures they may cooperate.

### Phase 2 (from end of phase 1 to the end of the second week)

- Main task
- i) Planning for : - safe and minimum water requirement  
- safe and sufficient food,  
- excreta, refuse and sullage disposal facilities,  
- shelters,  
- insect and rodent control,  
- other environmental health activities as necessary and required.
  
  - ii) Organization : - emergency services,  
for - staff on more full time basis,
  
  - iii) Supply of : - equipment, materials and supplies.
  
  - iv) Accommodation : - staff and stores.  
for

- v) Communication : - from site to Relief Centre and vice versa.
- vi) Action : - on planned activities to construct facilities, and provide services and mobilizing community participation.

Phase 3 (from end of phase 2 to end of emergency)

- Main task
- i) Operation & Maintenance : - of constructed facilities.
  - ii) Reappraisal of : - situation and planned activities on longer term basis,
    - housing situation
    - other specific environmental health services,
    - rehabilitation of environmental health schemes.
  - iii) Reorganization of : - administration from emergency to a more permanent basis.
  - iv) Action : - Consolidation of planned activities on a more permanent basis.

VI. EXPERIENCE ON MOUNT GALUNGGUNG ERUPTION AND PADANG PANJANG LANDSLIDE

A. Mount Galunggung Eruption

Galunggung volcano, located in Kabupaten Tasikmalaya of West Java Province, erupted on April 4, 1982. On April 5, about 31,000 people were evacuated from disastrous areas to several nearby kecamatans and the number increased to 33,491 on May 10. Distribution of these refugees varied from place to place, from less than 1,000 to about 8,000. Practically, within 24 hours of the disaster, immediate actions were taken by Environmental Health team in collecting information for assessing the situation. From after 24 hours onward, under the Coordination of the Coordinating Board of Disaster (SATKORLAK) refugees were relocated in schools; multipurpose building (Gedung Serba Guna), Madrasah (religious place), Offices, houses, etc. Damps and lava pockets to limit the dangerous zones were built. Immediately after the day of eruption, 70 shelters were built, 188 families were transmigrated while 2,000 families were planned for transmigration and the remaining 6,500 people for resettlement schemes.

Of the total 33,500 refugees, about 16,500 could not return to their villages as the results of the disaster. To relief the plight of these refugees, plan to build 330 temporary shelters for a period of 4-5 months was drawn up and implemented. Then permanent solution to solve their problems was made through resettlement schemes through:

- transmigration,
- resettlement (PIR)
- home base,
- movement to families/relatives.

Due to large number of refugees in many locations the Environmental Health personnel found themselves difficult and time consuming to move from one place to another. To facilitate their mobilization, the Dept. of Health provided them with motorcycles to discharge their duties. The urgent need for water supply and excreta disposal was determined as the available existing facilities were not adequate to cope with the demand. Though existing handpumps in the areas were not damaged, however, ground water table were substantially lowered preventing the pumps from pumping water out of the wells. Rivers and other water bodies were dried up or contaminated with mud and sand. The long dry season then also caused the decline of ground water table, further aggravating the situation. Survey conducted in 4 Kecamatan shown that 164 handpumps out of 349 (37%) were not functioning and flows from many protected springs decreased substantially.

In dealing with emergency water supply and sanitation problems, dugwells were constructed by the people and Department of Health provided 100 handpumps for installation. In addition trucks were brought in to transport water from other areas to the settlement sites. Funds for construction of 100 latrines were also made immediately available by the Department.

All handpump/well and latrines facilities were constructed with assistance from Provincial Health Services and SATKORLAK through community participation. In total, the 30 locations of the new shelters were provided with water supply from 1 pipe system and 218 handpumps (101 not functioning) and with 828 latrines.

Main constraints in this relief management experienced by the Environmental Health team were noted as follows: lack of coordination, slow in mobilization of assistance (manpower funds, S & E), lack of skilled personnel, and lack of information.

#### B. Padang Panjang Landslide

Padang Panjang is located in the Province of West Sumatera. The disaster occurred in Bukit Tui, and Sungai Induk-Padang Panjang Municipality on May 4, 1987. The event caused 130 lives, and necessitated the evacuation of 653 people from the disastrous areas. Step-wise actions undertaken in the field of Environmental Health were the following:

##### During the disaster

A Health team including sanitarians was established and integrated with the POSKO or Disaster Relief Team. The Team of SARKOLAK at Kabupaten level accommodated the refugees in schools, sport hall and homes of local residents/

##### After Disaster

Food: Food for refugees was provided by SATKORLAK through "Public Kitchen" (Dapur Umum) and food inspection was made by sanitarians to ensure its safe and hygienic conditions.

Water supply : Water supply did not seem to be a problem in term of quantity, as there were several existing water supply sources in the areas. The major concern was on quality of the supplied water and chlorination was done to ensure safety of drinking water.

Excreta disposal

"Latrine without water" were built at suitable distance from water supply sources in collaboration with the refugees.

Refuse disposal

Refuse bins were provided and refugees were requested to cooperate in disposing the refuse properly. Refuse from bins were collected and disposed of at dumping sites daily.

Vector Prevention and Control

Efforts were made to prevent and control vector transmission diseases particularly from flies and rodents. It was observed that flies bred heavily on dead bodies as well as at refuse dumping sites and rodents were concentrated in these areas. Conditions at these places were strictly brought under control to prevent the possible spread of diseases. Insecticides and equipment used were provided from the Development Budget of Environmental Health for vector control. Information on how to prevent and reduce fly and rodent population, such as proper disposal of refuse, keeping kitchen clean etc. were given to the refugees.

Health Education

Health education on personal and household hygiene was also provided intensively in addition to other measures undertaken.

Post disaster situation

About 50 families were able to return to their home land, living in new, simple houses built by Government and provided with dug wells and latrines. About 140 people were transmigrated to Kabupaten Pasaman Barat and other areas for resettlement.

VII. CONCLUSION

The existing Environmental Health programmes have in the past managed to relief the plight of people at times of several disasters. Preparedness to cope with events in any emergency situation have always been in full effect. However, the programmes as a whole still need to be strengthened and improved. More attention and increased fundings from Government in disaster relief management is needed. Participation and involvement of community in disaster preparedness and health management is also another weak area need to be strengthened and require support from all parties concerned as well as problems related to shortage of professional and skilled manpower in dealing disaster events. The success of the programme depends much on the effective inter and intra sectoral coordination and for this a sound mechanism for speedy and effective implementation need to be established at all levels.

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