# Mission PAHO / WHO
# MONTSERRAT
# (15th October - 10th November 1997)

**Dr. Gerald Egmann**

"Specialist Accident and Emergency support to health services on Montserrat"

## ACKNOWLEDGEMENTS

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# I PROBLEMATIC

## I-1 Presentation of Montserrat

Montserrat is a small West Indian Island 39 $km^2$. It lies 40 km (25 miles) southwest of Antigua, north of Guadeloupe and south of Nevis and St Kitts
It is a British colony with a usual population of about 12 000 before the volcanic crisis
The weather is warm (25-27 C / 78-80 F) with a rainy season (June to November) and a dry season (December to May).

In the southeast, there is the Soufriere Hills Volcano The highest point of the island is Chances Pick at 3 000 feet.

## I-2 Chronology of the Eruption of Soufriere Hills Volcano

*(Montserrat Volcano Observatory)*

- **Stage 1 Pre-eruptive seismic activity**

Jan 92: Start of earthquake swarms in the south of Montserrat
June 92: One of the largest precursory earthquake swarms.

- **Stage 2 Start of eruption. Phreatic stage.**

From the 18th of June 95 to the 21st of August 95· First large phreatic eruption, which blanketed Plymouth in a thick ash cloud and cause darkness for about 15 minutes
First evacuation of southern Montserrat initiated shortly afterwards.

- **Stage 3 Start of Dome Activity**

From early September 95 to the 30th October 95

- **Stage 4 Quiet Dome Building**

From the 14th November 95 to March 96
1st of December 95. 2nd evacuation of southern Montserrat until the 1st of January 96.

- **Stage 5 Dome collapses and pyroclastic flows**

From the 29th of March 96 to September 96.
3rd of April 96 3rd evacuation of the southern Montserrat.

**Stage 6 Explosive activity**

On the 17th and 18th of September 96: A major ash plume rose about 40 000 feet and about 600 000 tons of ash was deposited on the southern part Montserrat.

- **Stage 7 Continued Dome Growth and the Gallway's wall**

From the 1st of October 96 to the 11th of April 97.
On the 11th of April, a major pyroclastic flows down White River to within 500 m of sea at O'Garros

- **Stage 8 Continued Dome Growth. Pyroclastic flow in northern ghauts.**

**On the 25th of June 97**, at 12:55 local time a pyroclastic flow commenced from lava dome in the crater of the Soufriere Hills Volcano. In the following 25 minutes, a series of devastating flows swept the northern flanks of the volcano, down Mosquito Ghaut and followed the Paradise River almost to the sea. The flows and associated surge clouds damaged or destroyed between 100 and 150 houses, with the villages of Streatham, Dyers, Harris, Bethel, Bramble, Trants, Farms and Spanish point being severely affected.
Nine people are confirmed dead, and a further 19 were missing. Eleven people suffered serious burns.

The pyroclastic flows were the largest produced during the current eruption, and the intensity of the activity exceeded that of the explosion of the 17th of September 96. An estimated 4 to 5 million cubic meters of lava dome was unloaded during the event, and the flows and surges covered an area of 4 square kilometers. An ash cloud rose to about 10 km, and ash fell over western Montserrat.

Since July, there has been approximately 70 explosions and the activity of the volcano is still critical.

## I-3 Present situation

*(see Montserrat Volcano Risk Map)*

From the Montserrat Vulcano Observatory, the most likely outcome over the next 6 months remains that the volcanic activity will continue at similar or somewhat elevated levels to those seen in the past 3 months There is also a somewhat lower chance that the eruption will decline.

The area of Old Towne and parts of Frith are highly vulnerable to pyroclastic flows Old Towne, Frith, Olverston and Salem are threatened by pyroclastic surges and fall-out of pumice blocks from explosions that are large enough to cause injury and damage to buildings There is also a long-term heath hazard in Salem from breathing fine ash.

The area from Nantes River to Lawyers Mountain is vulnerable to fall-out of potentially dangerous pumice blocks and pyroclastic surges. The level of hazard decreases significantly as one moves northwards across the area.

The topography in the Lawyers Mountain area forms a natural barrier and the level of hazard falls off substantially to the north of this boundary.

Northern Montserrat is much safer than the central areas to the south Lawyers Mountain. Northern Montserrat is susceptible to fall-out from substantially larger eruptions, but protective measures could be taken by a well-prepared society.

The probability of a very violent pyroclastic surge moving over the Centre Hills into Northern Montserrat is low, but continued occupation of the north would have to take account of the destructive impact were such a event to occur.

The probability of a large magnitude explosive eruption on the scale of Krakatoa 1883 is regarded as very low to negligible.

All of this was report at the end of September 97 and is still current

## I-4 Problems

Presently, there is around 4000 to 5000 people still living on the island
The present population can be divided by geographic distribution:

- the southern part of the island which is completely evacuated;
- the area in the west incorporating Salem, Frith, and Olde Towne, which has been partially evacuated and is due for complete evacuation by 29 September 1997. About 50 people are still reluctant to leave this area;
- the central zone between the Nantes and Lawyers rivers with approximately 800 people;
- the Northern part of the island which contains the remainder of the population.

Details concerning the demography of the population or its health needs are unknown However there are approximately

- 250 frail elderly people requiring some level of institution care of whom 150 are in shelters and 100 in the community;
- 120 people with mental illnesses currently requiring medication. Of these some 20 people have chronic illnesses not appropriately managed, which leaves them vulnerable to increased risk from the volcano

Between the 20th and the 25th of September 97, a team of senior health care professionals and specialists from the United Kingdom visited the island at the request of Montserratian Government.
Theirs conclusions were that there are four main factors which threaten the health of the people of Montserrat.

1. Death and serious injuries from continuing major volcanic activity.
   It was reported that the MVO should complete the work on modeling the impact of a large eruption which involved the central zone The lack of a working model directly affects the preparedness and response capacity in the event of a mass casualty disaster.

2. An inadequate health care system.
   It was reported that the heath care system is inadequate and even before the volcanic activity started, when there were a 68 bed general hospital in Plymouth and 12 health clinics scattered around the island, many professional people did not use the system but went off-island when they needed care. The hospital has since been destroyed and "relocated" in the northern part of the island.

3 High levels of volcanic ash containing crystalline silica
   There are also in many occupied parts of the island high levels of volcanic ash containing crystalline silica. The impact on the population has not yet been

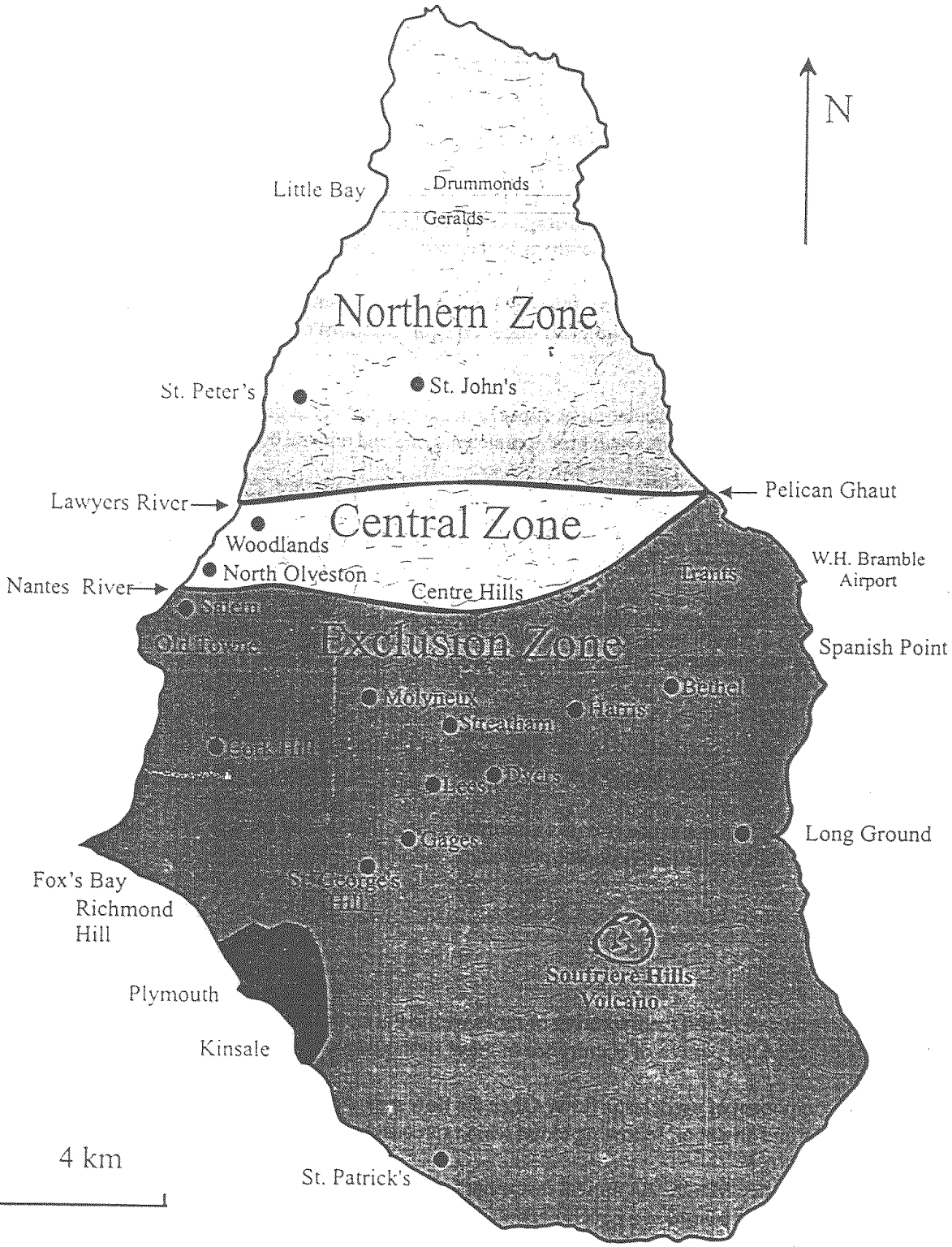
study and for now, the only application is that people are advised to wear a protective mask

4 Social and Environmental Factors

Finally, they dealt with the social and environmental factors which may result in many health complications (outbreak of diseases, increased dependency and institution care) [1]

[1] *Health and Health Service Implications of the Montserrat Crisis* 27 September 1997, Sir Kenneth Calman

# Montserrat Volcano Risk Map
## Sept. 1997

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|---|---|
| Exclusion Zone | No admittance except for scientific monitoring and National Security purposes |
| Central Zone | Residential area only, all residents on heightened state of alert.<br>All residents to have their own rapid means of exit 24 hours per day<br>Hard hat area. All residents to have hard hats and dust masks. |
| Northern Zone | Area with significantly lower risk, suitable for residential and commercial occupation |