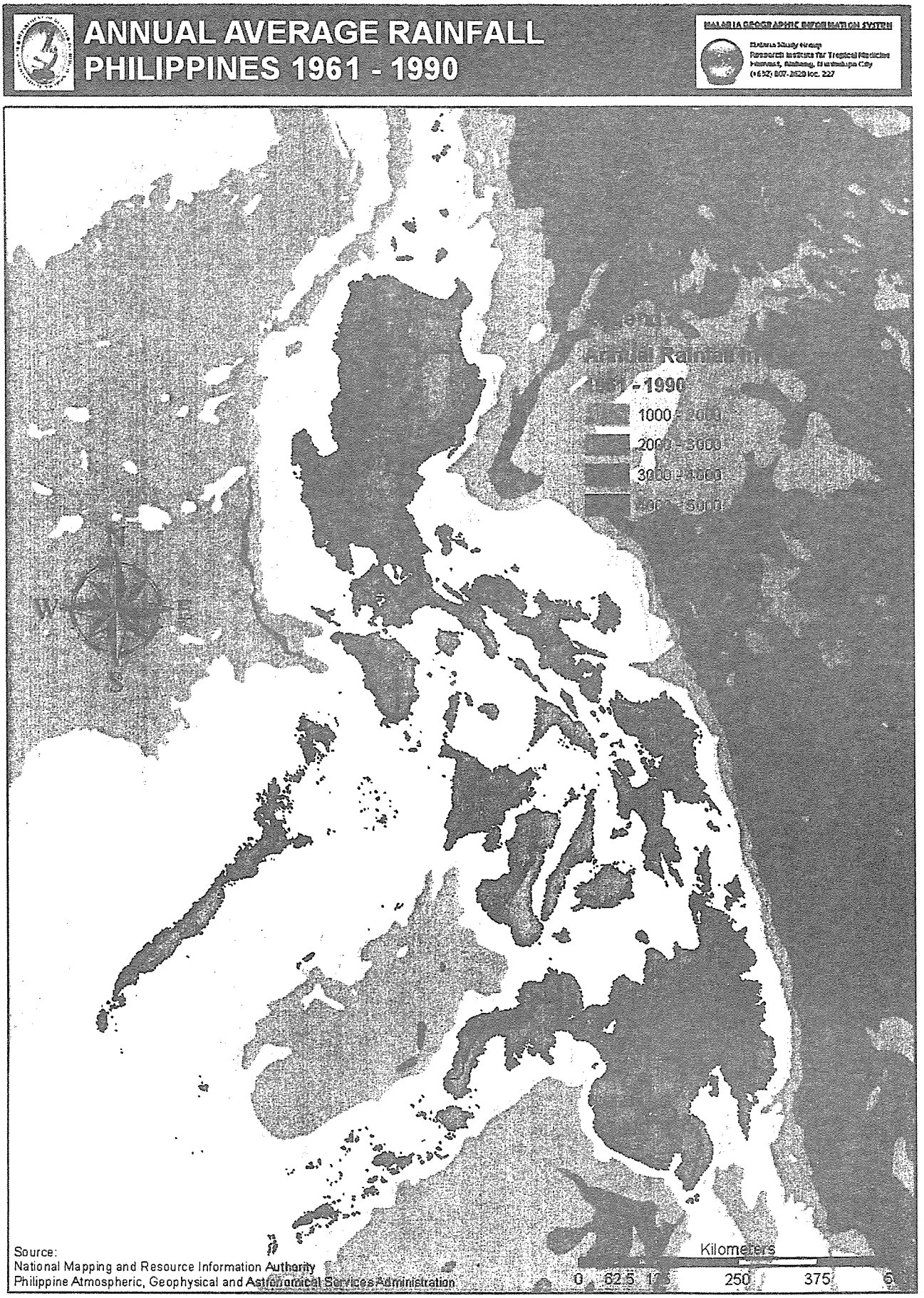
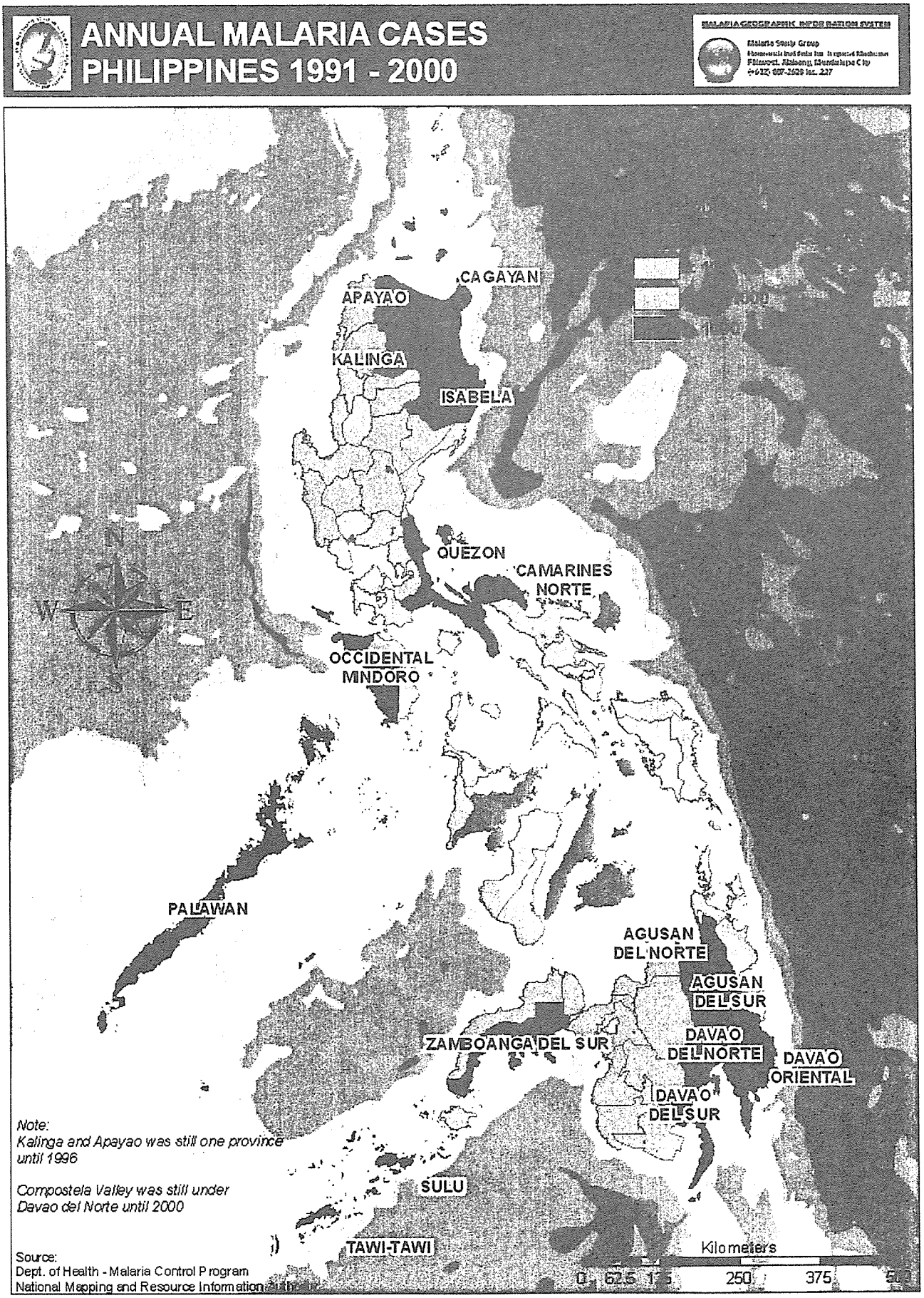
MAP 5


ANNUAL AVERAGE RAINFALL
PHILIPPINES 1961 - 1990
MALARIA GEOGRAPHIC INFORMATION SYSTEM
Malaria Study Group
Research Institute for Tropical Medicine
Filinvest, Alabang, Muntinlupa City
(632) 807-2629 loc. 227
Annual Rainfall
1961 - 1990
1000 - 2000
2000 - 3000
3000 - 4000
4000 - 5000
Kilometers
0 62.5 125 250 375 5
Source:
National Mapping and Resource Information Authority
Philippine Atmospheric, Geophysical and Astronomical Services Administration

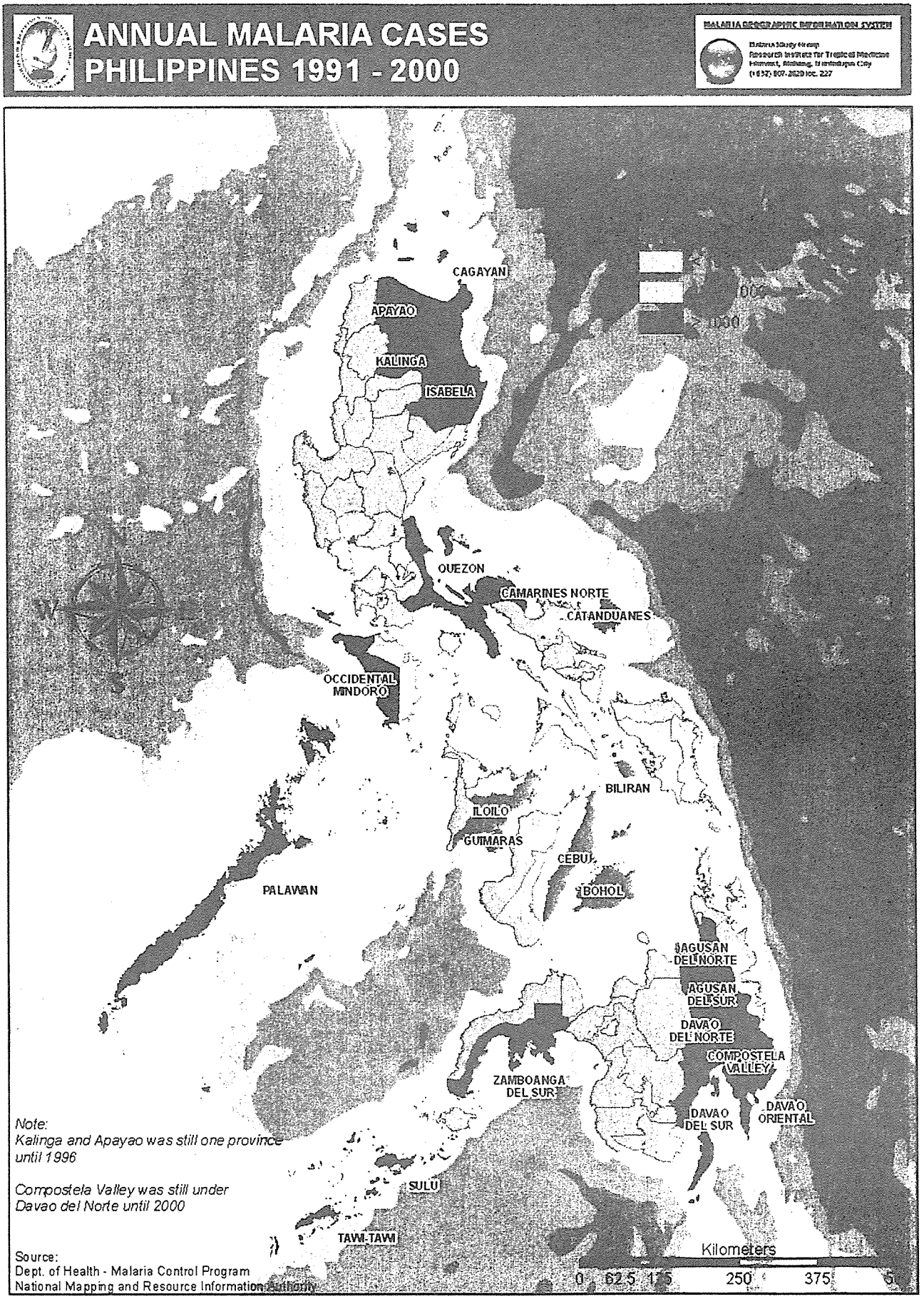
MAP 6


FOREST COVER
PHILIPPINES
MALARIA GEOGRAPHIC INFORMATION SYSTEM
Kilometers
0 62.5 125
Information Authority
World,
Systems Research Institute, 1993

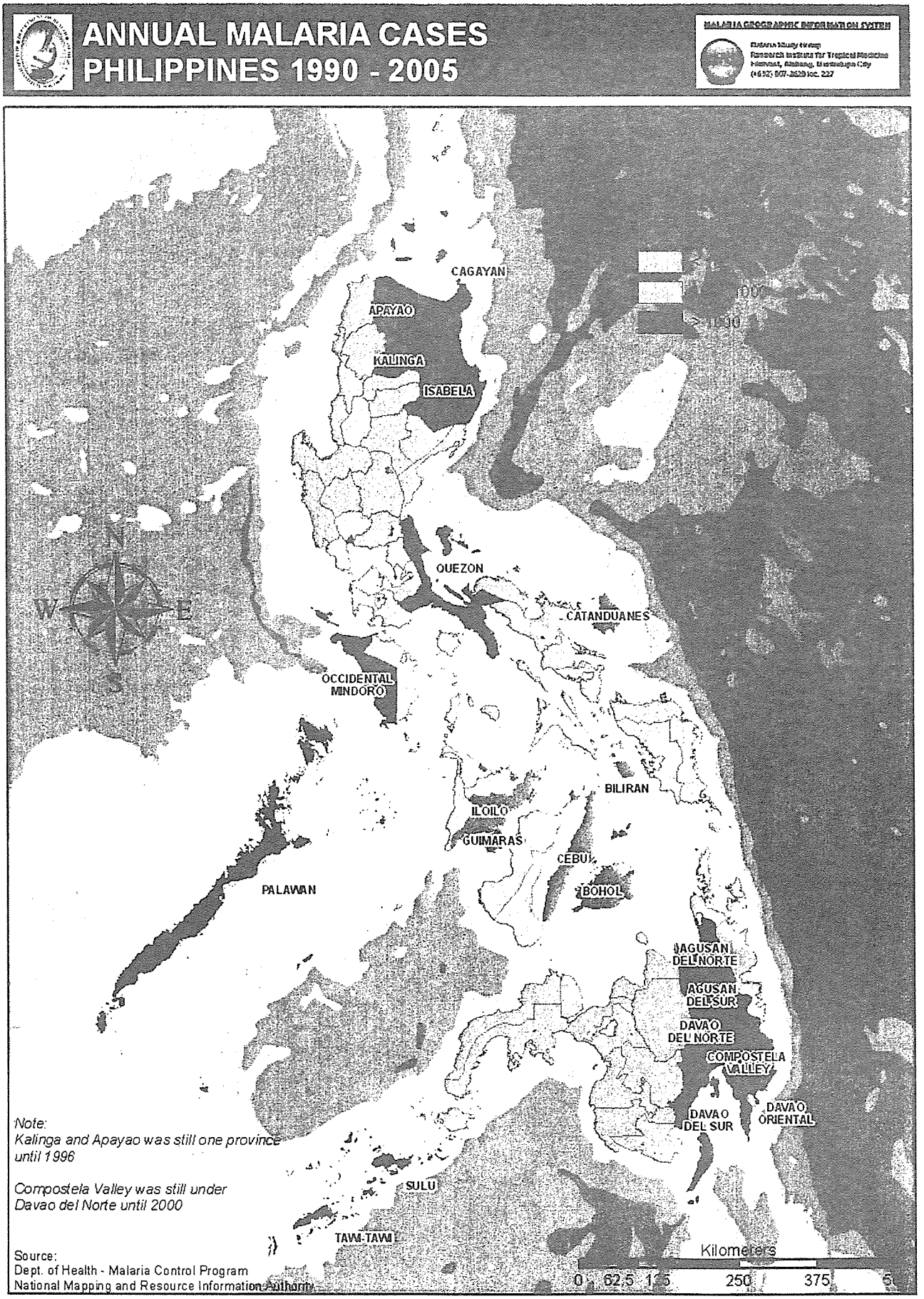
MAP 7


ANNUAL MALARIA CASES
PHILIPPINES 1991 - 2000
CAGAYAN
APAYAO
KALINGA
ISABELA
QUEZON
CAMARINES NORTE
OCCIDENTAL MINDORO
PALAWAN
AGUSAN DEL NORTE
AGUSAN DEL SUR
ZAMBOANGA DEL SUR
DAVAO DEL NORTE
DAVAO ORIENTAL
DAVAO DEL SUR
SULU
TAWI-TAWI
W
E
Note:
Kalinga and Apayao was still one province until 1996
Compostela Valley was still under Davao del Norte until 2000
Source:
Dept. of Health - Malaria Control Program
National Mapping and Resource Information
Kilometers
0
62.5
250
375

MAP 8


ANNUAL MALARIA CASES
PHILIPPINES 1991 - 2000
MALARIA GEOGRAPHIC INFORMATION SYSTEM
CAGAYAN
APAYAO
KALINGA
ISABELA
QUEZON
CAMARINES NORTE
CATANDUANES
OCCIDENTAL MINDORO
BILIRAN
ILOILO
GUIMARAS
CEBU
BOHOL
PALAWAN
AGUSAN DEL NORTE
AGUSAN DEL SUR
DAVAO DEL NORTE
COMPOSTELA VALLEY
ZAMBOANGA DEL SUR
DAVAO DEL SUR
DAVAO ORIENTAL
SULU
TAWI-TAWI
Note:
Kalinga and Apayao was still one province until 1996
Compostela Valley was still under Davao del Norte until 2000
Source:
Dept. of Health - Malaria Control Program
National Mapping and Resource Information Authority
Kilometers
0 62.5 125 250 375

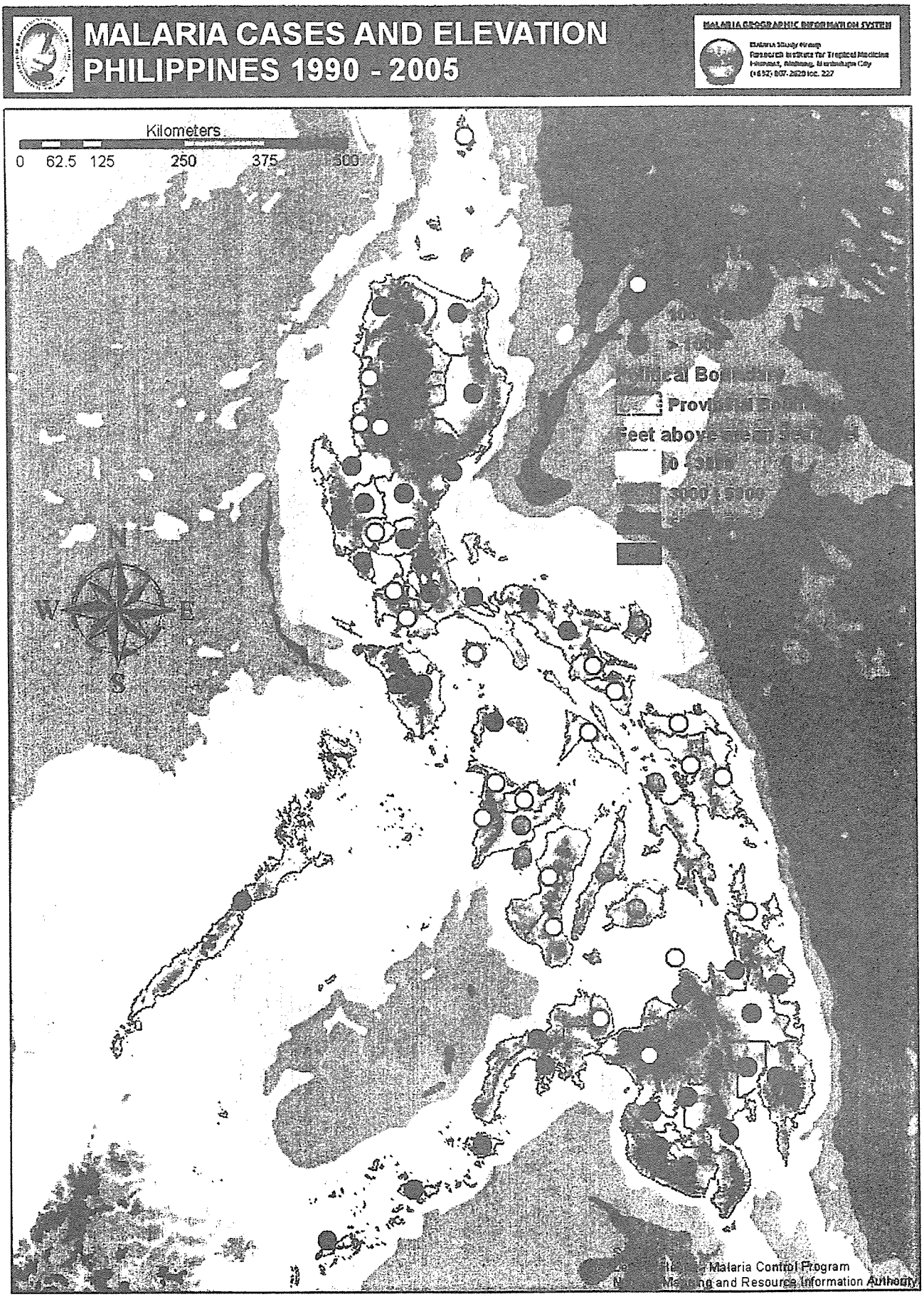
MAP 9


ANNUAL MALARIA CASES
PHILIPPINES 1990 - 2005
MALARIA GEOGRAPHIC INFORMATION SYSTEM
CAGAYAN
APAYAO
KALINGA
ISABELA
QUEZON
CATANDUANES
OCCIDENTAL MINDORO
BILIRAN
ILOILO
GUIMARAS
CEBU
BOHOL
PALAWAN
AGUSAN DEL NORTE
AGUSAN DEL SUR
DAVAO DEL NORTE
COMPOSTELA VALLEY
DAVAO DEL SUR
DAVAO ORIENTAL
SULU
TAWI-TAWI
N
W
E
S
Note:
Kalinga and Apayao was still one province until 1996
Compostela Valley was still under Davao del Norte until 2000
Source:
Dept. of Health - Malaria Control Program
National Mapping and Resource Information Authority
Kilometers
0
62.5
125
250
375

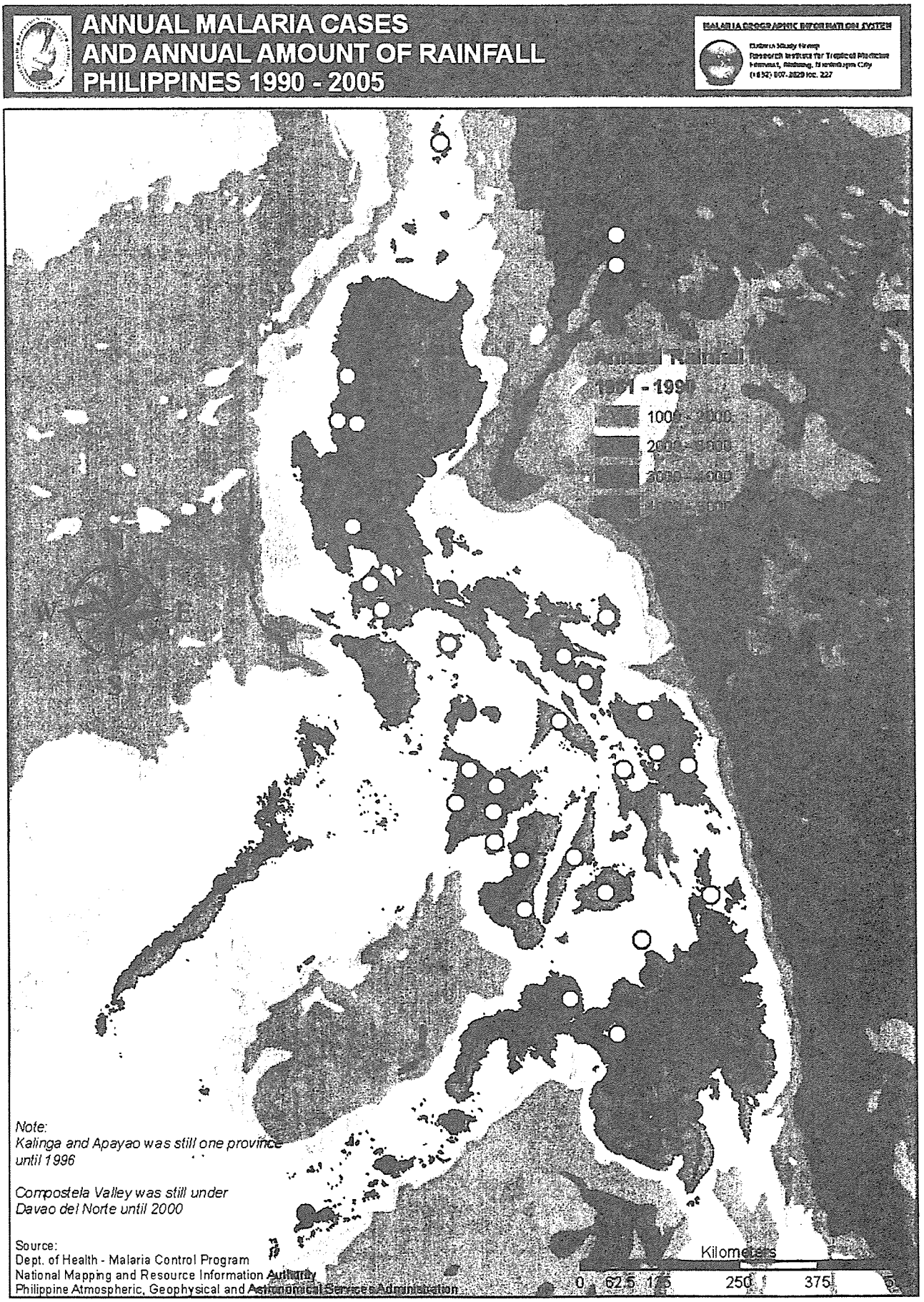
MAP 10


MALARIA CASES AND FOREST COVER
PHILIPPINES 2005
MALARIA GEOGRAPHIC INFORMATION SYSTEM
Kilometers
0 62.5 125 250 375 500
W
Malaria Control Program
and Resource Information Autho

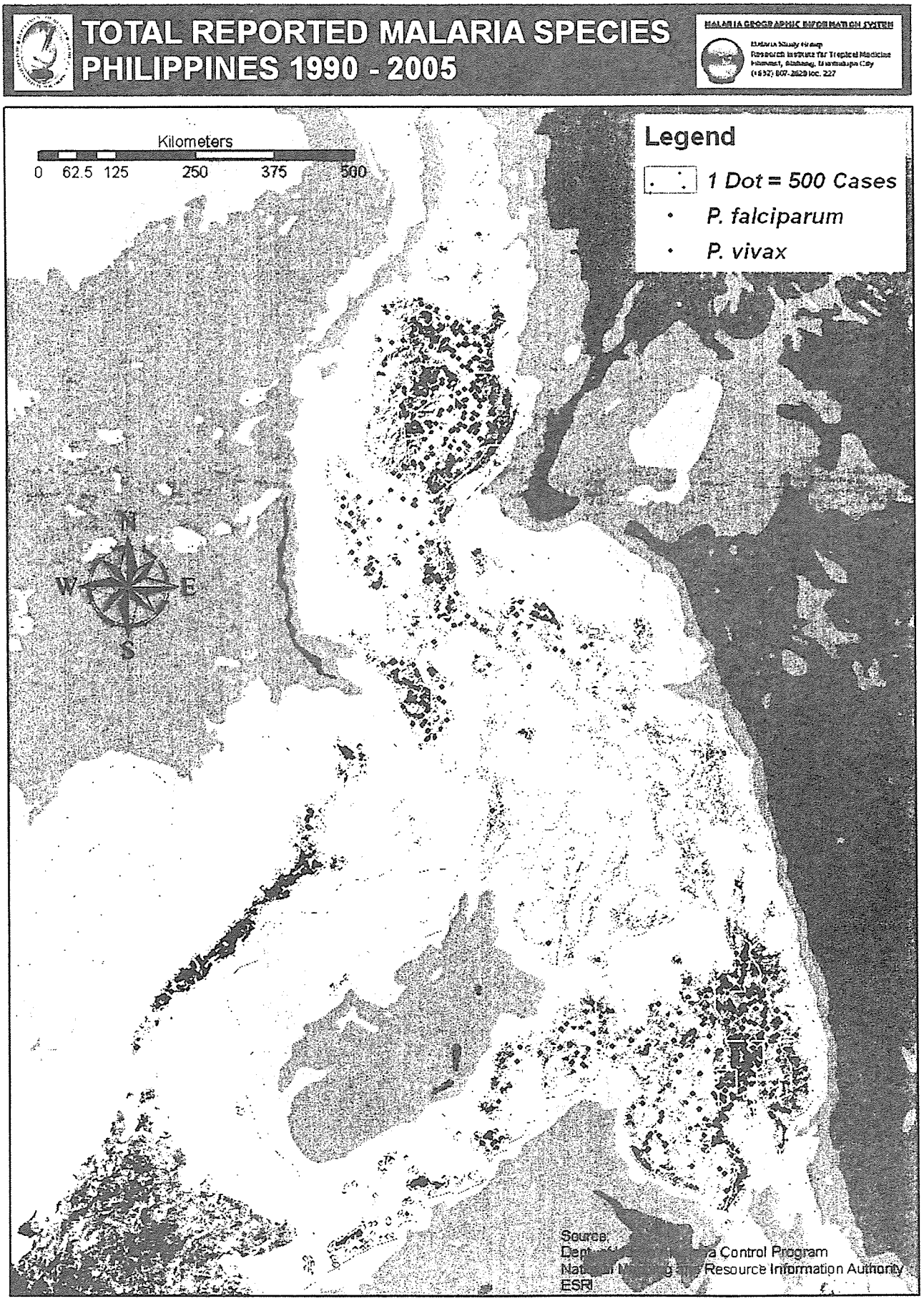
MAP 11


MALARIA CASES AND ELEVATION
PHILIPPINES 1990 - 2005
MALARIA GEOGRAPHIC INFORMATION SYSTEM
Kilometers
0 62.5 125 250 375 500
N
W
E
S
Malaria Control Program

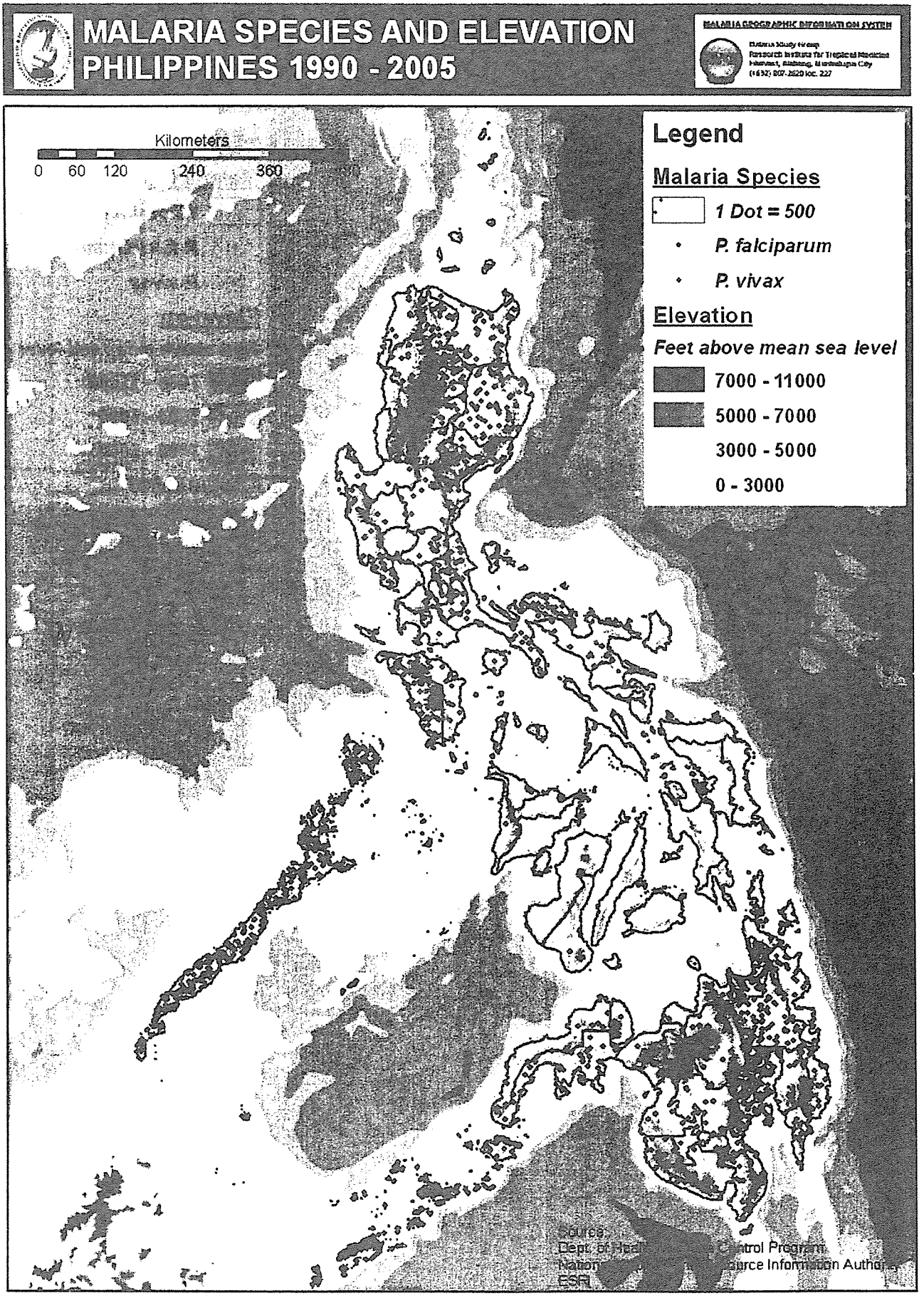
MAP 12


ANNUAL MALARIA CASES
AND ANNUAL AMOUNT OF RAINFALL
PHILIPPINES 1990 - 2005
MALARIA GEOGRAPHIC INFORMATION SYSTEM
1000 - 1999
2000 - 3999
Note:
Kalinga and Apayao was still one province until 1996
Compostela Valley was still under Davao del Norte until 2000
Source:
Dept. of Health - Malaria Control Program
National Mapping and Resource Information Authority
Philippine Atmospheric, Geophysical and Astronomical Services Administration
Kilometers
0 62.5 125 250 375

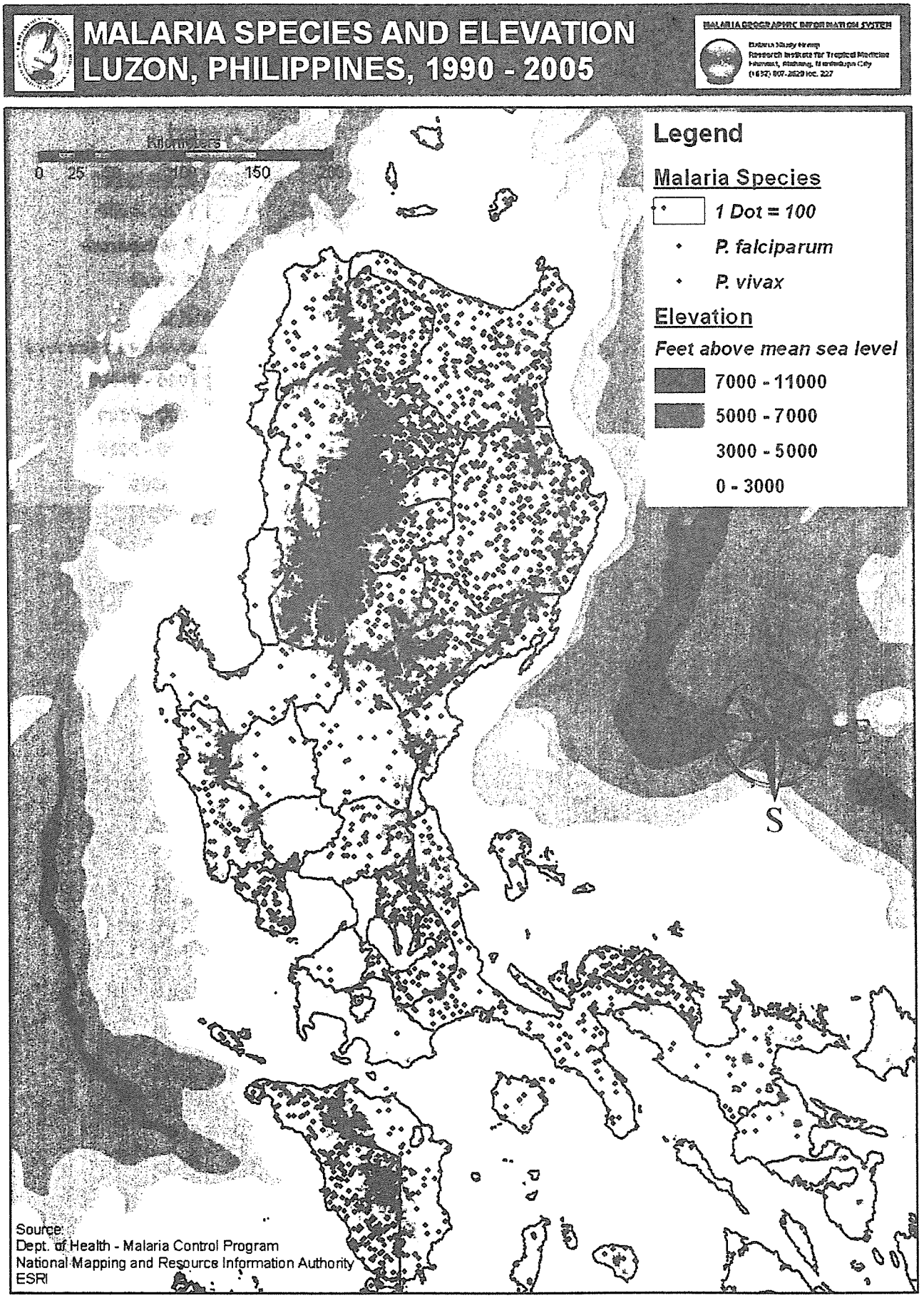
MAP 13


TOTAL REPORTED MALARIA SPECIES
PHILIPPINES 1990 - 2005
MALARIA GEOGRAPHIC INFORMATION SYSTEM
Kilometers
0 62.5 125 250 375 500
Legend
1 Dot = 500 Cases
P. falciparum
P. vivax
N
W
E
S
Source:
Control Program
Resource Information Authority
ESRI

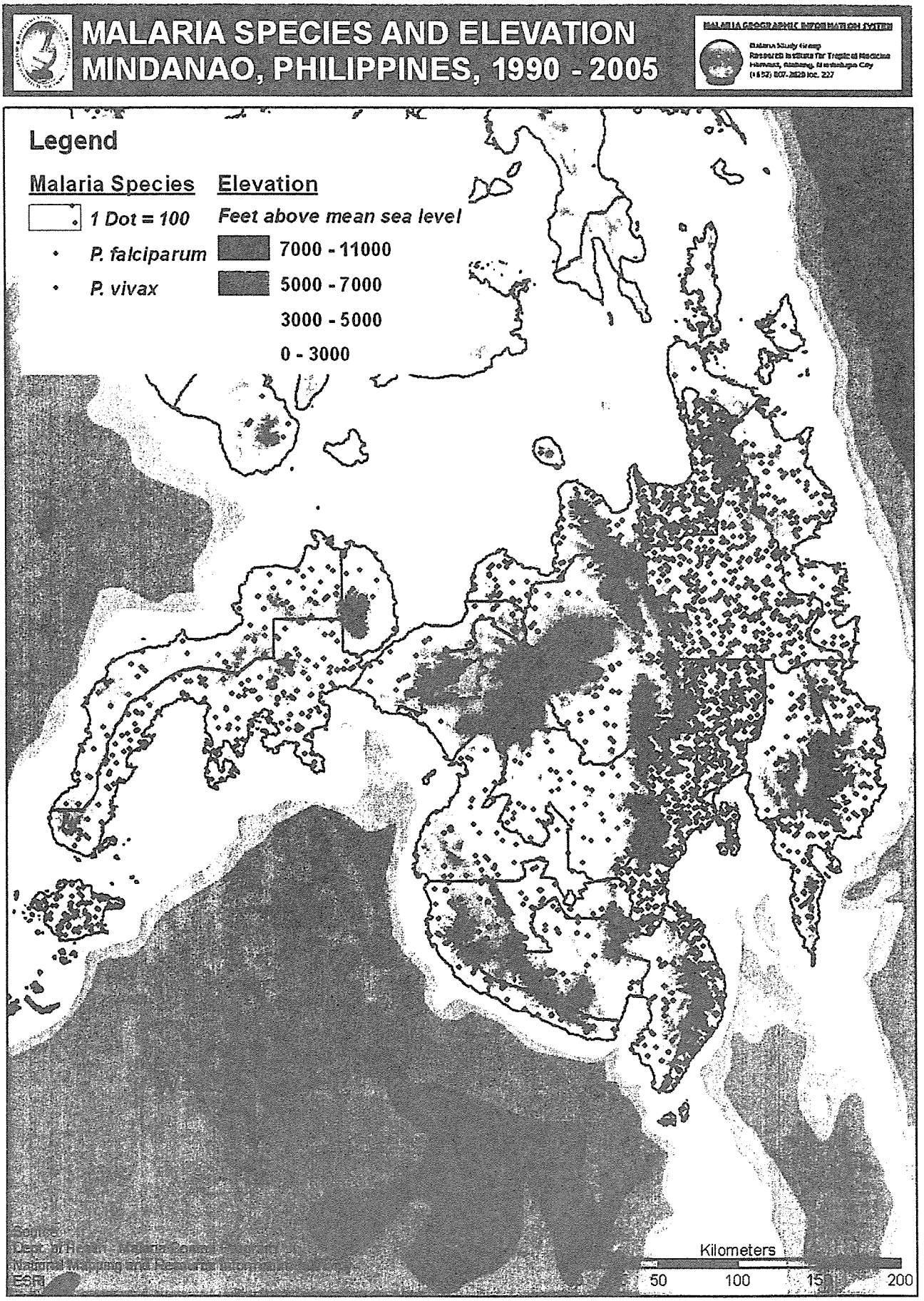
MAP 14


MALARIA SPECIES AND ELEVATION
PHILIPPINES 1990 - 2005
MALARIA GEOGRAPHIC INFORMATION SYSTEM
Kilometers
0 60 120 240 360
Legend
Malaria Species
1 Dot = 500
P. falciparum
P. vivax
Elevation
Feet above mean sea level
7000 - 11000
5000 - 7000
3000 - 5000
0 - 3000

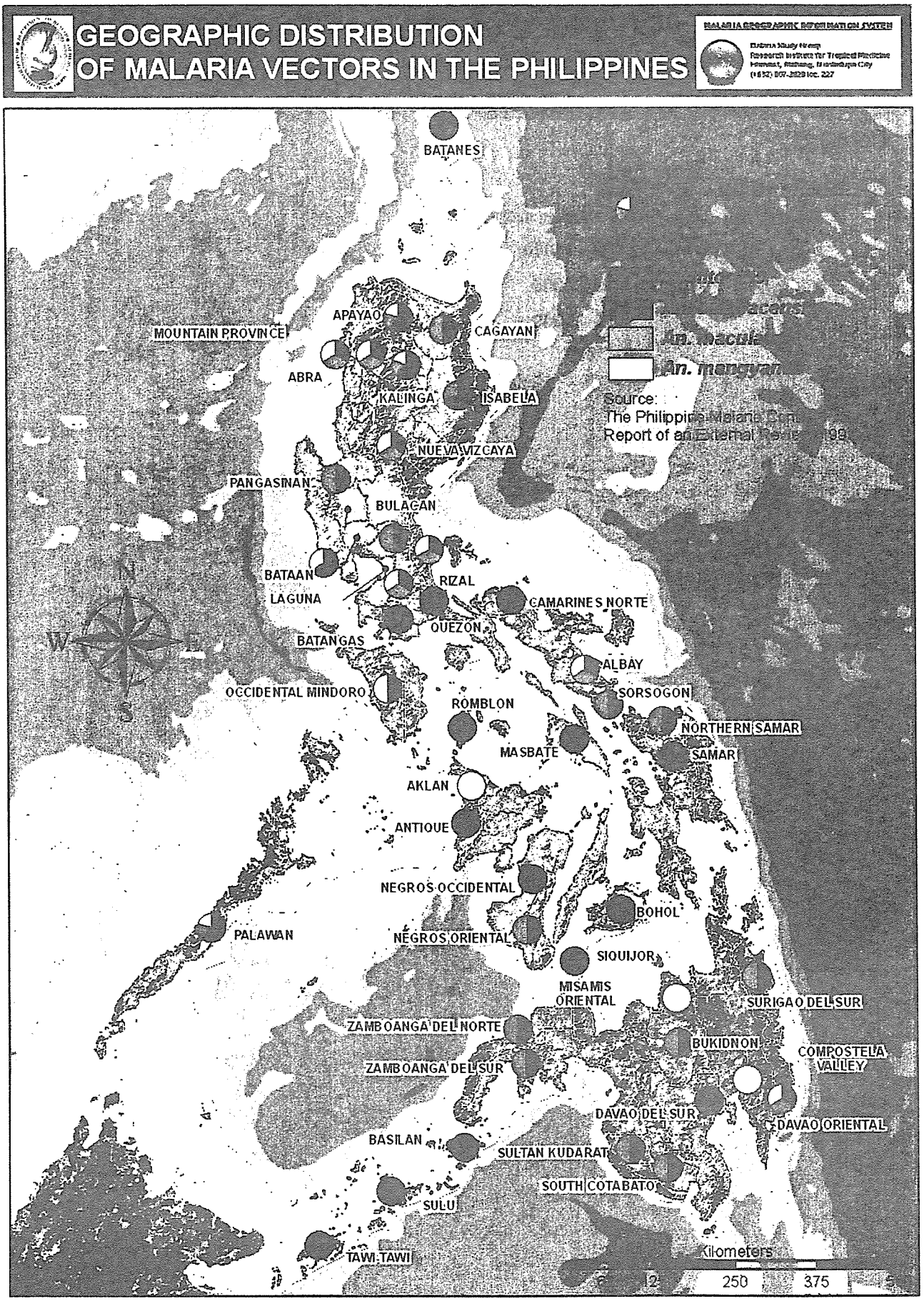
MAP 15


MALARIA SPECIES AND ELEVATION
LUZON, PHILIPPINES, 1990 - 2005
MALARIA GEOGRAPHIC INFORMATION SYSTEM
Research Institute for Tropical Medicine
0 25 150
Legend
Malaria Species
1 Dot = 100
P. falciparum
P. vivax
Elevation
Feet above mean sea level
7000 - 11000
5000 - 7000
3000 - 5000
0 - 3000
S
Source:
Dept. of Health - Malaria Control Program
National Mapping and Resource Information Authority
ESRI

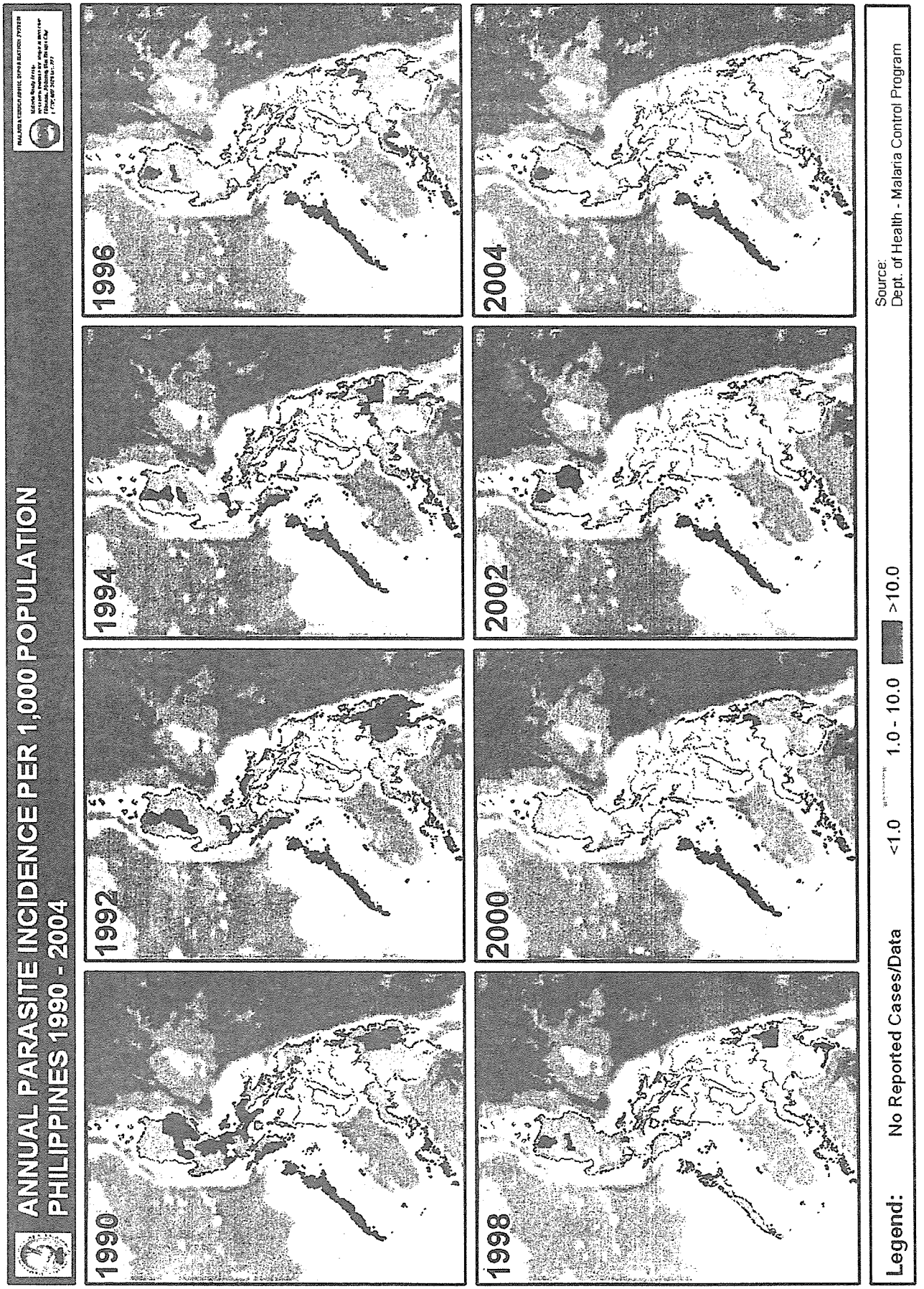
MAP 16


MALARIA SPECIES AND ELEVATION
MINDANAO, PHILIPPINES, 1990 - 2005
MALARIA GEOGRAPHIC INFORMATION SYSTEM
Legend
Malaria Species
1 Dot = 100
P. falciparum
P. vivax
Elevation
Feet above mean sea level
7000 - 11000
5000 - 7000
3000 - 5000
0 - 3000
Kilometers
50
100
15
200
ESRI

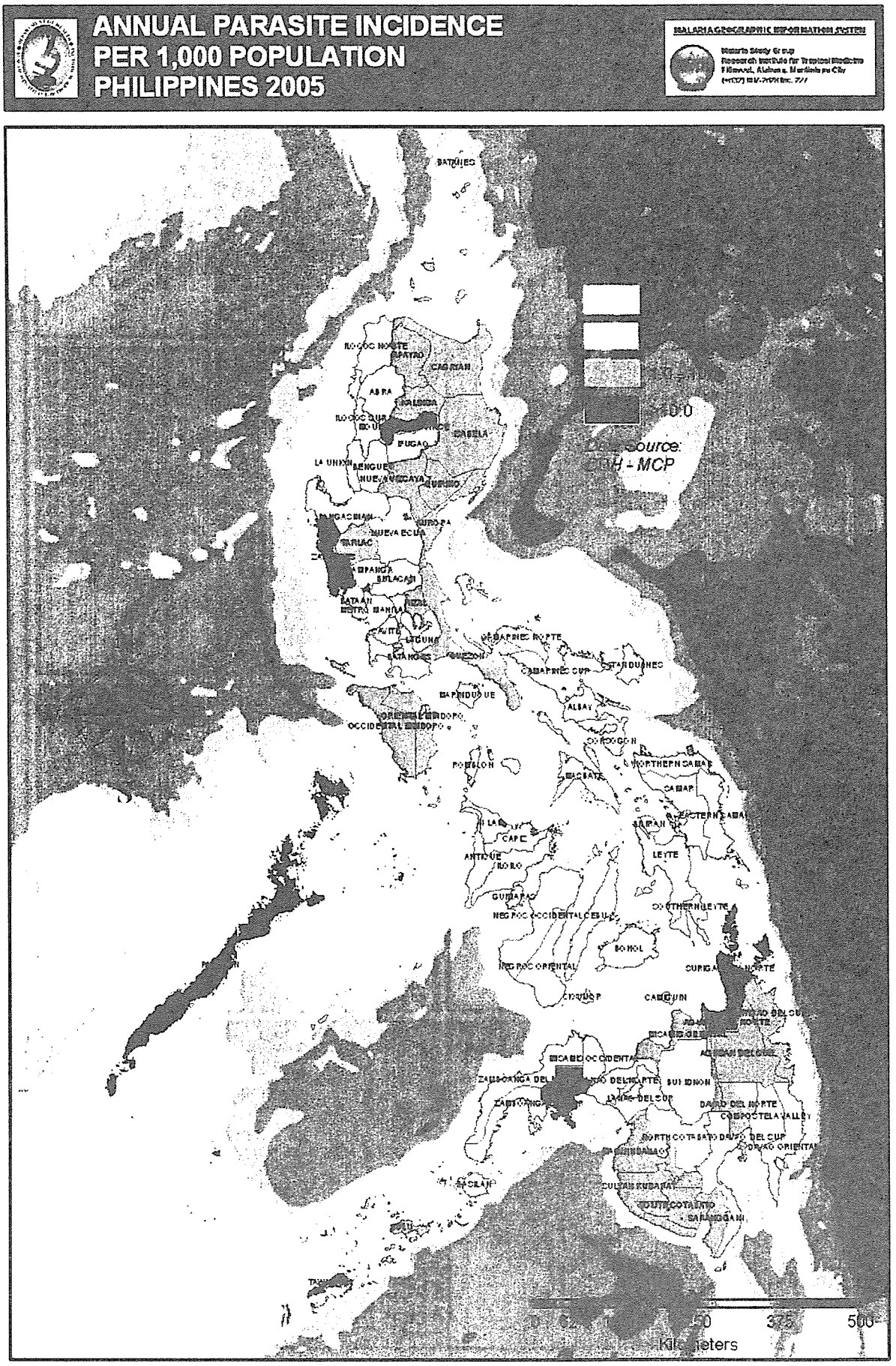
MAP 17


GEOGRAPHIC DISTRIBUTION
OF MALARIA VECTORS IN THE PHILIPPINES
MALARIA GEOGRAPHIC INFORMATION SYSTEM
BATANES
APAYAO
CAGAYAN
MOUNTAIN PROVINCE
ABRA
KALINGA
ISABELA
NUEVA VIZCAYA
PANGASINAN
BULACAN
BATAAN
RIZAL
LAGUNA
CAMARINES NORTE
QUEZON
BATANGAS
ALBAY
OCCIDENTAL MINDORO
ROMBLON
SORSOGON
NORTHERN SAMAR
MASBATE
SAMAR
AKLAN
ANTIQUE
NEGROS OCCIDENTAL
BOHOL
PALAWAN
NEGROS ORIENTAL
SIQUIJOR
MISAMIS ORIENTAL
SURIGAO DEL SUR
ZAMBOANGA DEL NORTE
BUKIDNON
COMPOSTELA VALLEY
ZAMBOANGA DEL SUR
DAVAO DEL SUR
DAVAO ORIENTAL
BASILAN
SULTAN KUDARAT
SOUTH COTABATO
SULU
TAWI-TAWI
Kilometers
250
375

MAP 18


ANNUAL PARASITE INCIDENCE PER 1,000 POPULATION
PHILIPPINES 1990 - 2004
1990
1992
1994
1996
1998
2000
2002
2004
Legend:
No Reported Cases/Data
<1.0
1.0 - 10.0
>10.0
Source:
Dept. of Health - Malaria Control Program

MAP 19


ANNUAL PARASITE INCIDENCE
PER 1,000 POPULATION
PHILIPPINES 2005
MALARIA GEOGRAPHIC INFORMATION SYSTEM
Source:
DOH - MCP
BATANES
ILOCOS NORTE
CAGAYAN
ABRA
APAYAO
ILOCOS SUR
ISABELA
KALINGA
LA UNION
BENGUET
NUEVA VIZCAYA
QUIRINO
PANGASINAN
NUEVA ECIJA
TARLAC
PAMPANGA
BULACAN
BATAAN
METRO MANILA
RIZAL
CAVITE
LAGUNA
BATANGAS
QUEZON
AURORA
BARANGAY NORTE
CAMARINES SUR
CATANDUANES
MARINDUQUE
ALBAY
ORIENTAL MINDORO
OCCIDENTAL MINDORO
ROMBLON
SORSOGON
MASBATE
NORTHERN SAMAR
CAMIGUIN
EASTERN SAMAR
SAMAR
CAPIZ
ANTIQUE
ILOILO
LEYTE
GUIMARAS
NEGROS OCCIDENTAL
SOUTHERN LEYTE
BOHOL
NEGROS ORIENTAL
SURIGAO NORTE
CEBU
CAMIGUIN
MISAMIS OCCIDENTAL
ZAMBOANGA DEL NORTE
SUR IDNON
LANAO DEL SUR
DAVAO DEL NORTE
COMPOSTELA VALLEY
NORTH COTABATO
DAVAO ORIENTAL
SULTAN KUDARAT
SOUTH COTABATO
SARANGANI
TAWI-TAWI
0
250
500
Kilometers

REDUCTION OF THE FREQUENCY OF EPIDEMICS THROUGH BETTER STRATEGIES USING THE PRESENT MALARIA INFORMATION SYSTEM IN SOLOMON ISLANDS

SUMMERY REPORT

November 2006-February 2007

BY

BERNARD BAKOTEE

PUBLIC HEALTH TRAINING AND RESEARCH &DISTANCE EDUCATION (SIMTRI)
MINISTRY OF HEALTH AND MEDICAL SERVICES
SOLOMON ISLANDS

CONTENT

Reduction of the frequency of epidemics through better strategies using the present malaria information system in Solomon Islands.

1. INTRODICTION

The worst malarious country in the Western Pacific Region is the Solomon Islands. In 1992 the annual malaria incidence was 440 cases/1000 population. This was reduced to160 cases/1000 population in 2005. One of the contributing factors to this reduction is the improvement of the malaria information system and the change of strategies used.

Fifty eight percent of the health facilities in the Solomon Islands provide malaria diagnostic services. Each month their records are sent to their respective regions. The regions would analyze the data to select the worst problem villages and attend them as soon as possible.

It takes about two weeks for the data from the health facilities to reach the regional supervisor. By the time the villages are attended it's already 3-4 weeks delayed.

For the VBDCP to be more effective a pro-active strategy has to be developed to help attend priority villages sooner, than waiting for 2 weeks for the delayed data to arrive before responding.

This study is to find out a pro-active strategy that will help attend problem villages sooner.

This study started in November 2006 and this report is a summery of results obtained within the period November 2006 to February 2007. It is still progressing and new data. Results that will be obtained in future may change the findings found now.

1.1. MAIN OBJECTIVES OF THE STUDY:

1) The strategy used, which is to select problem villages, as they appear monthly, has not actually been proven if it's the best strategy. This study is to determine if being pro-active in determining problem villages and attending them based on historical data before another epidemic occurs is an effective strategy in reducing the frequency of epidemics and malaria as a whole.

2) Does the period that the reports arrive from the health facilities for analyses verses the time of attending the problem villages justifies the use of this present passive –action strategy?
3) To determine if the use of climate data could be used as an alternative system to predict epidemics and forecast malaria cases. Hence, timely implementation of appropriate malaria control activities.
4) To determine the relationship between *P.vivax* malaria and the impact of malaria control activities to provide guidelines for strategic planning.

1.1.1. Specific objectives

1) Find the frequency of occurrence of problem villages based on past records and monitor them for one year.
2) Determine if pro-action on problem villages is a better strategy than the present passive –action method in regards to cost of control operation, time of implementation of operation and reduction of malaria.
3) Improve the quality of malaria diagnoses of microscopists in regions of study.
4) Determine the relationship between MBS and incidence in a problem village and if that relationship could be used to predict or confirm an epidemic.
5) Develop a malaria warning system for a region and for their problem communities.
6) Analyzing both meteorology and malaria data to develop a system that could assist malaria officers in predicting epidemics and forecasting malaria cases. Hence responding in time, while waiting for malaria data to arrive from the clinics.
7) Determine the relationship between *P.vivax* predominance and the impact of malaria control activities.

1.2. STUDY AREA

The study is done in the Central region of Malaita province and Tetere region of Guadalcanal province. Both have the highest populations and highest malaria in their respective provinces. Environmentaly they are different. Central region is a wet are with rainfall throughout the year. Tetere region is in a savannah area and has a distinct dry season in the middle of the year.

For the *P.vivax* study the results presented in this report covers the whole country.

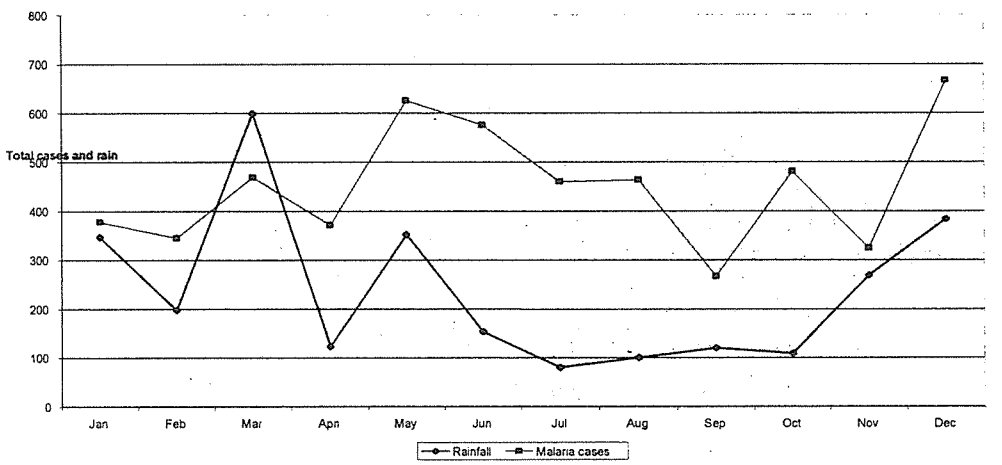
2. RESULTS FROM CENTRAL REGION OF MALAITA PROVINCE-MALARIA AND CLIMATE ANALYSES

2.1. Analyzing both meteorology and malaria data to develop a system that could assist malaria officers in predicting epidemics and forecasting malaria cases. Hence responding in time, while waiting for malaria data to arrive from the clinics.

2.1.1) Rainfall and Malaria cases correlation

When monthly rainfall data is correlated with its corresponding malaria cases there is a positve correlation shown for the first eight months of the year (Jan-Aug). When rainfall increases in a particular month cases will increase simultaneously, though at different rates. A total of eight months showed positive correlation

Fig. 1: Central region of Malaita-Rainfall and Malaria cases -2000



In 2001, a total of eight months showed a positive correlation. In 2002, a total of nine months, in 2003, a total of seven.

The same is seen also for 2004 and 2005, that positive correlation does not occur for all the months.

2.1.2. Rainfall and Malaria Incidence correlation

When correlating monthly rainfall and its corresponding malaria incidence there was a positive correlation in the first eight months of the year (Jan-Aug) as seen for rainfall and cases correlation in Fig.1.

The correlation of incidence and rainfall in 2001,2003,2004 and 2005, also show that positive correlations do not occur on the same months.