Lecture: Human Ecology (I), M. Umezaki, May 26, 2006

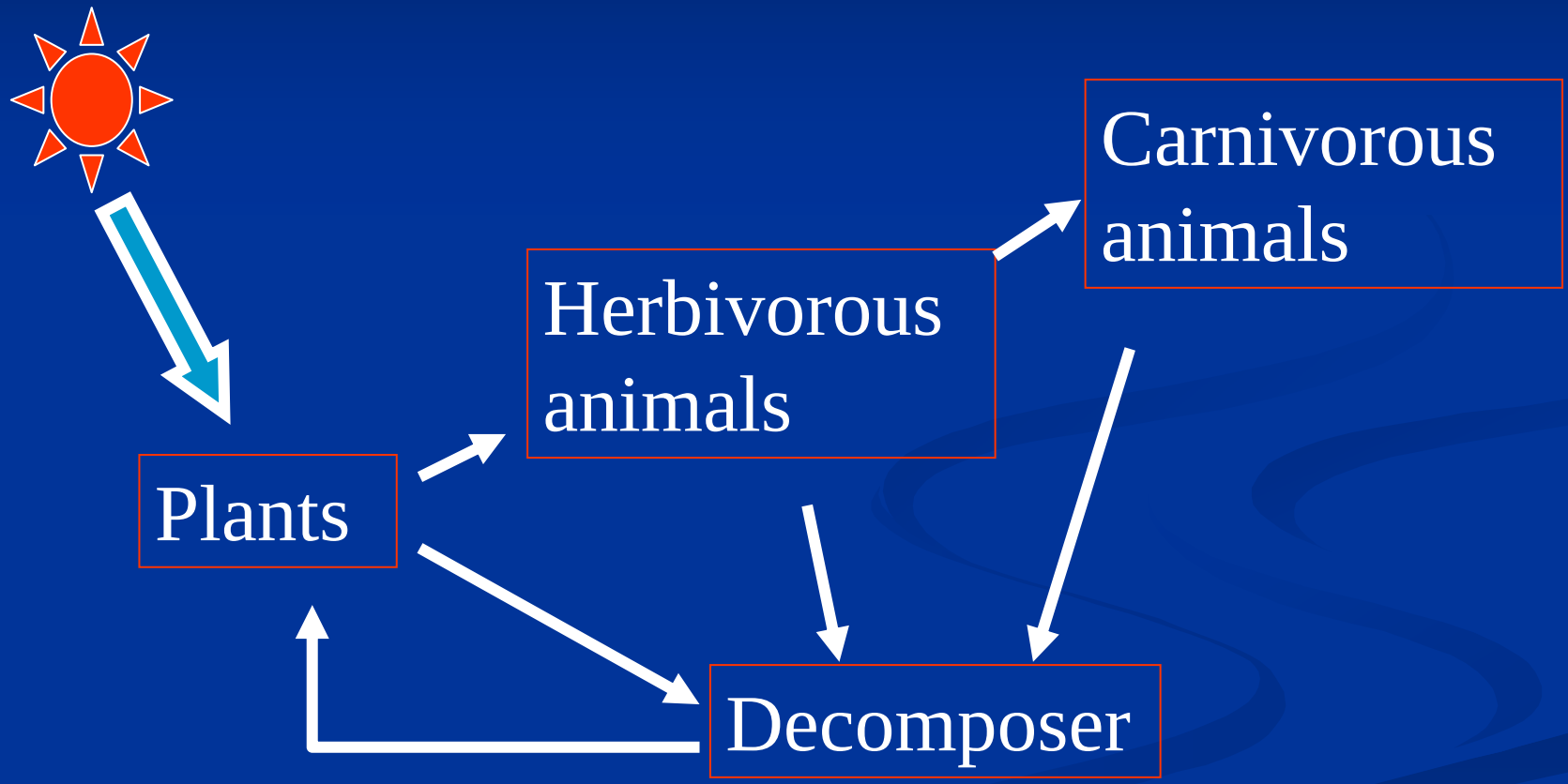
Methodologies of data collection in the field

- Selection of the subjects
- Collection and interpretation of “discourse”
- Food consumption
- Time allocation
- Energy expenditure
- Indicators of health status

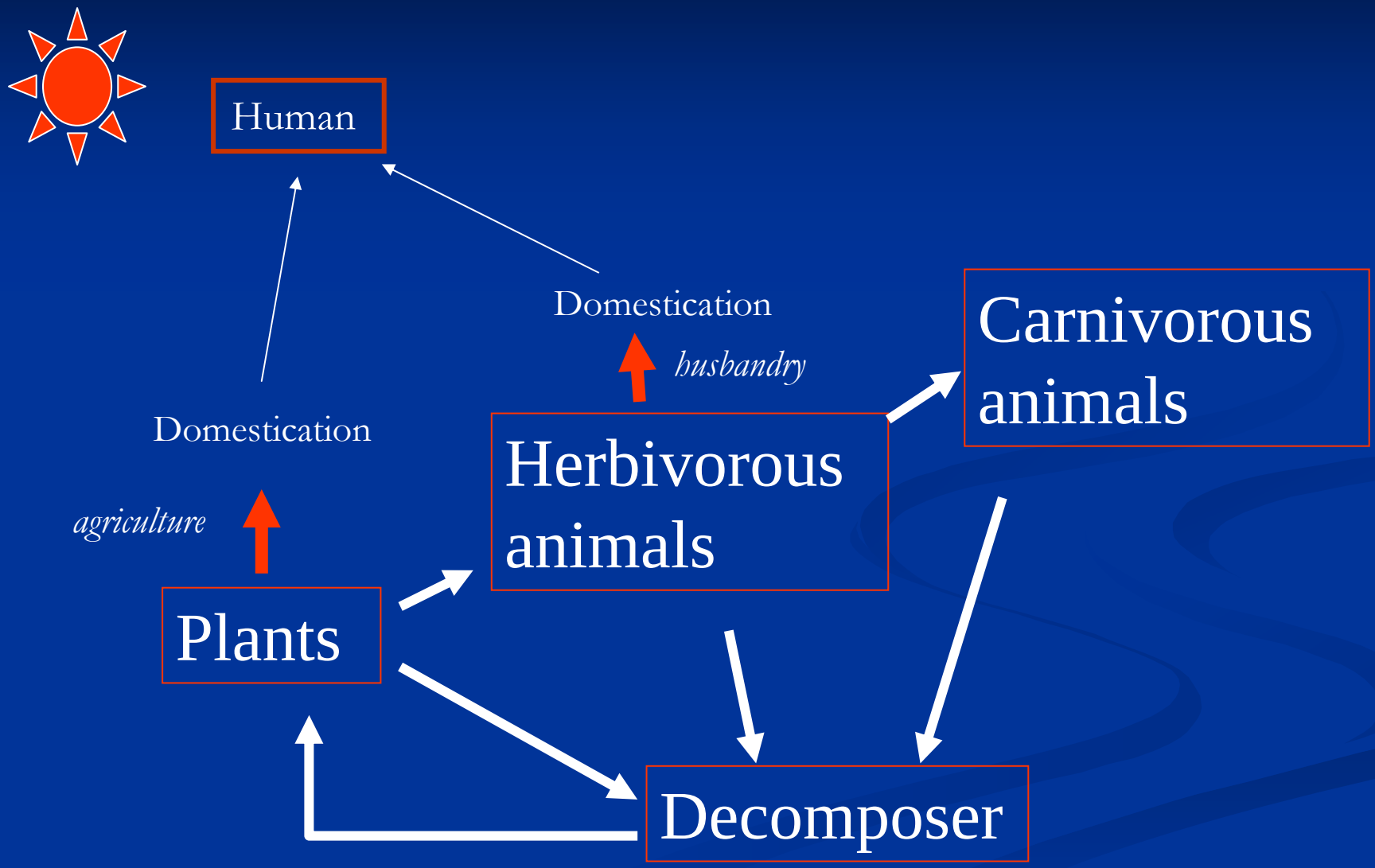
Background

Function and structure of ecosystem

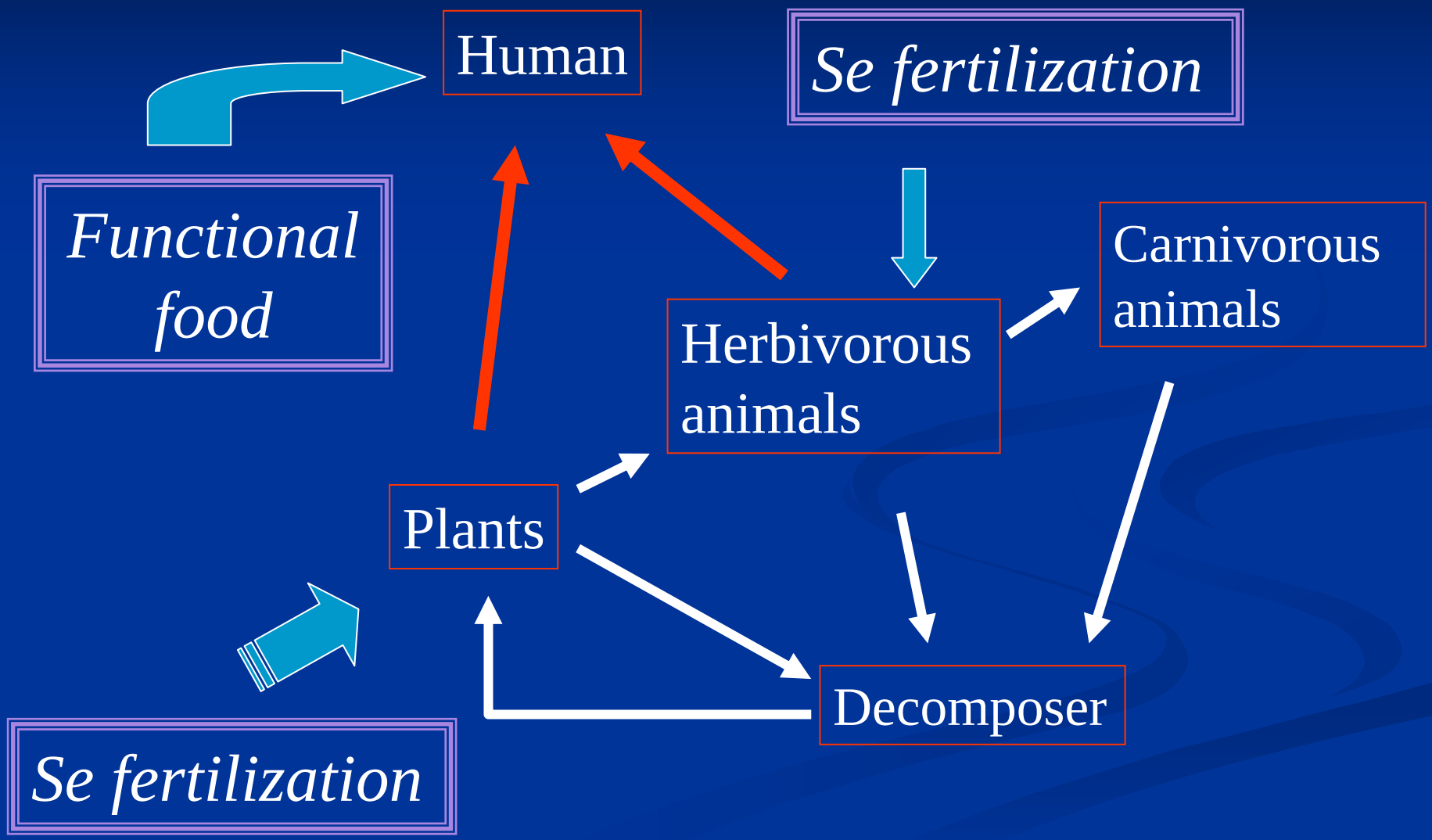
Ecosystem


Carnivorous animals
Herbivorous animals
Plants
Decomposer

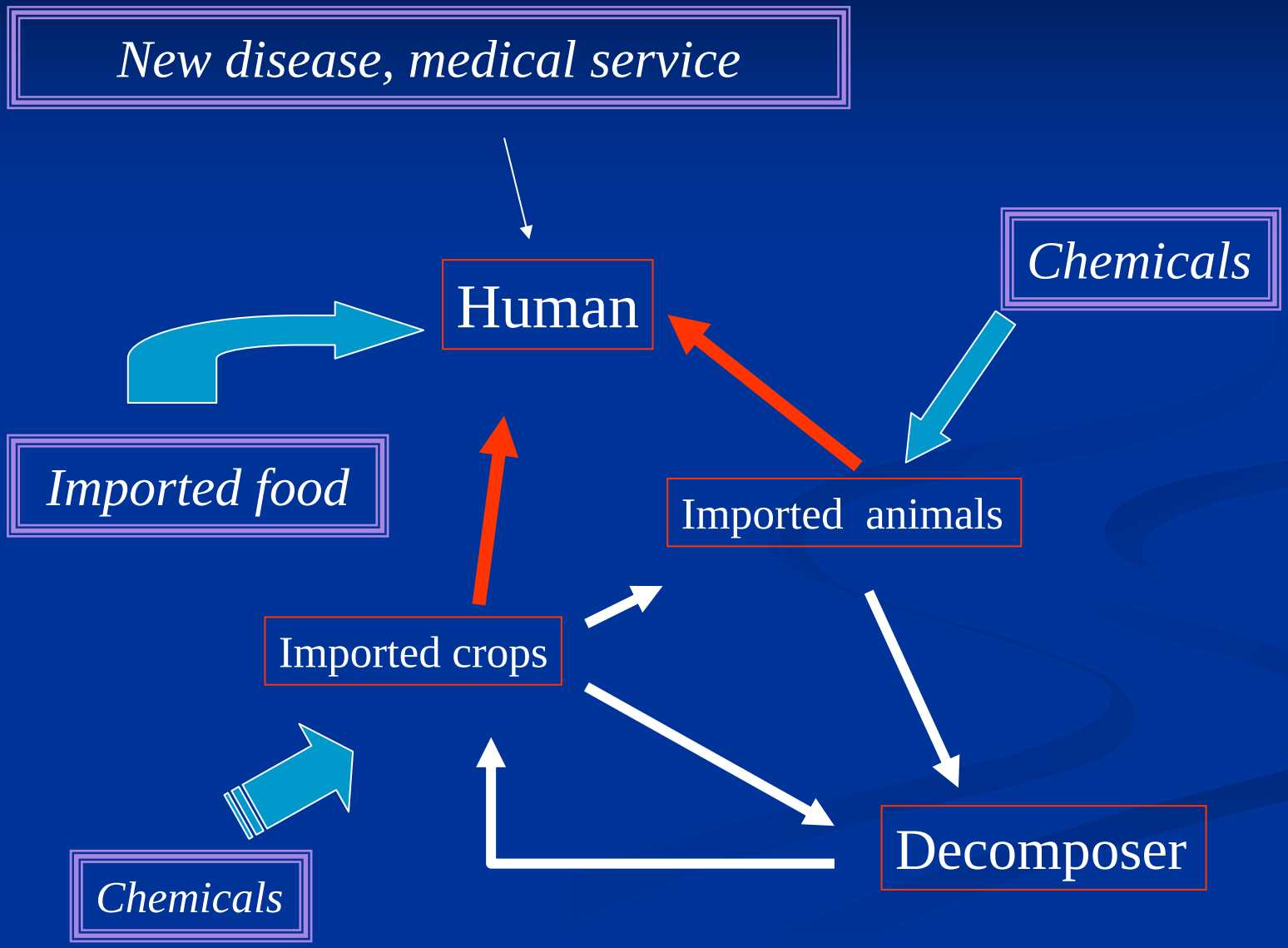
Ecosystem


Human
Domestication
husbandry
Carnivorous animals
Domestication
agriculture
Herbivorous animals
Plants
Decomposer

ex. Enhancing Se in ecosystem



ex. Modernization of ecosystem



Selection of the subjects

Ultimate Study Target

Organism ---------- e.g., Biology
Homo sapiens ------ e.g., Anthropology
Human being ------- e.g., Medicine
Nation ---------- e.g., Economics
Region ---------- e.g., Policy maker
Population ---------- e.g., Ecology
Community --------- e.g., Community workers
An individual ------- e.g., Friend

Human Ecology? International Health?

National Nutritional Survey	“Bad” survey
Population	All Japanese	?
Statistically		
Sample	Randomly selected sample	Sample selected carelessly

Various levels of “population”

Population

Statistically

Sample

1. Dietary pattern in Tokyo
2. Dietary pattern in Tokyo Univ. students
3. Dietary pattern of department members
4. Dietary difference by sex

Dietary pattern in Tokyo?
Contribution to science?

Selection of the subjects

Population ---- Sample

"Ecological" study

Population =Language group, ethnic group, regional population
Sample=Selected considering the heterogeneity of the population

-"Ecological" population
-"Genetic" population

All the people in a ecosystem

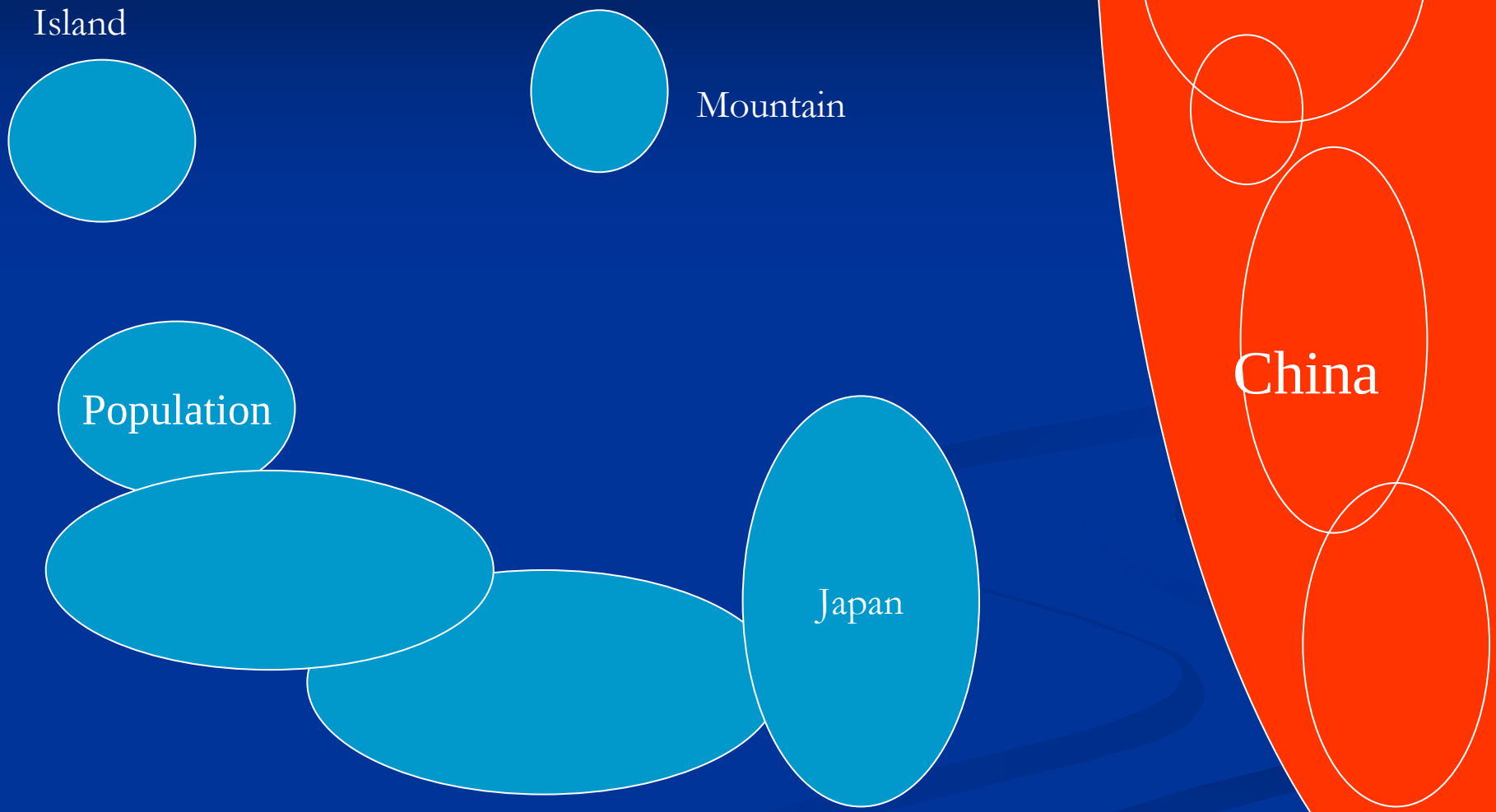
Epidemiology

Population =Japanese, Japanese DM patients
Sample=statistically selected, statistically valid number, but less consideration of heterogeneity of the population

-Random sampling
-Stratified sampling
-Cluster sampling
-Multi-stage sampling


東京都
Tokyo
埼玉県
西多摩郡
奥多摩町
A
青梅市
瑞穂町
日の出町
羽村市
武蔵村山市
東大和市
東村山市
清瀬市
東久留米市
練馬区
板橋区
北区
足立区
葛飾区
荒川区
豊島区
台東区
墨田区
江戸川区
中野区
杉並区
新宿区
中央区
江東区
渋谷区
港区
目黒区
品川区
世田谷区
大田区
C
D
E
B
檜原村
あきる野市
福生市
立川市
昭島市
小平市
国分寺市
小金井市
西東京市
武蔵野市
三鷹市
国立市
日野市
府中市
調布市
狛江市
八王子市
多摩市
稲城市
町田市
山梨県
N=10,000,000
How to sample “representative sample”??
伊豆諸島
大島町
利島村
新島村
神津島村
三宅村
御蔵島村
八丈町
青ヶ島村
小笠原諸島
小笠原村
父島
母島
北硫黄島
硫黄島
F
N

Image of “ecological” populations



The extent of overlap=distance, obstacle (mountain, sea)

Understanding of dynamics of human “population”

Cross-sectional adaptation to the environment
Adaptability to extreme environment
Change under environmental change
Change under social change
Separation and integration of populations

Ultimate goal is to clarify the variation in the dynamics of human population for the understanding of survival of *Homo sapience* or *Human being*

Fieldwork

Collection and interpretation of “discourse”

Fieldwork

Since B. Malinowski's fieldwork in Trobriand Islands (1914-18)

Rapport the subject people
Ability to communicate
Sufficient duration of stay
Thick description/understanding the events in the context of the society

A part of human ecologists, cultural anthropologists, ecological anthropologists

A WHO consultant,
Focus group discussion, JICA people

A fieldworker recognize himself/herself:

- How can I make friends with the people?
- I can survive here, anyway.
- It is cool for me to stay with the people.
- I am only the person in Japan who can communicate with the people.
- I understood everything. I am almost a native.

- I came here from Japan, but the people did not go to Japan. Why?
- I understand that my understanding for the people is limited.
- What I studied has scientific meaning?
- What is a ideal relationship between the people and myself?

Preparation for fieldwork:

1. Collect and read all the books and papers about the study areas.
2. Study the language spoken in the study area.

Fieldwork	Questionnaire Survey Focus group discussion
>2 years	<1 months
Case study	Statistical analysis Text analysis
Context	Generalization
Understanding	Interpretation

+ Biomedical study

What the people talked is what they really think?
What the people talked to you is what they talk to their family members?
Will you tell your salary to foreigners?
Why you were interested in the topic?

People who conduct study.

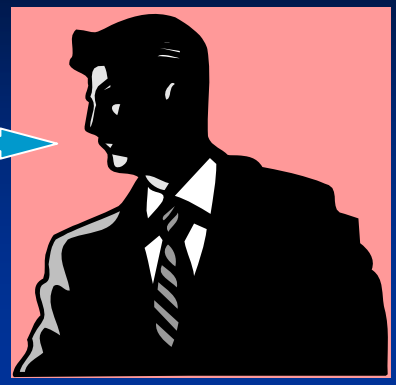
People who are studied.

Food consumption survey

Why food consumption is important?

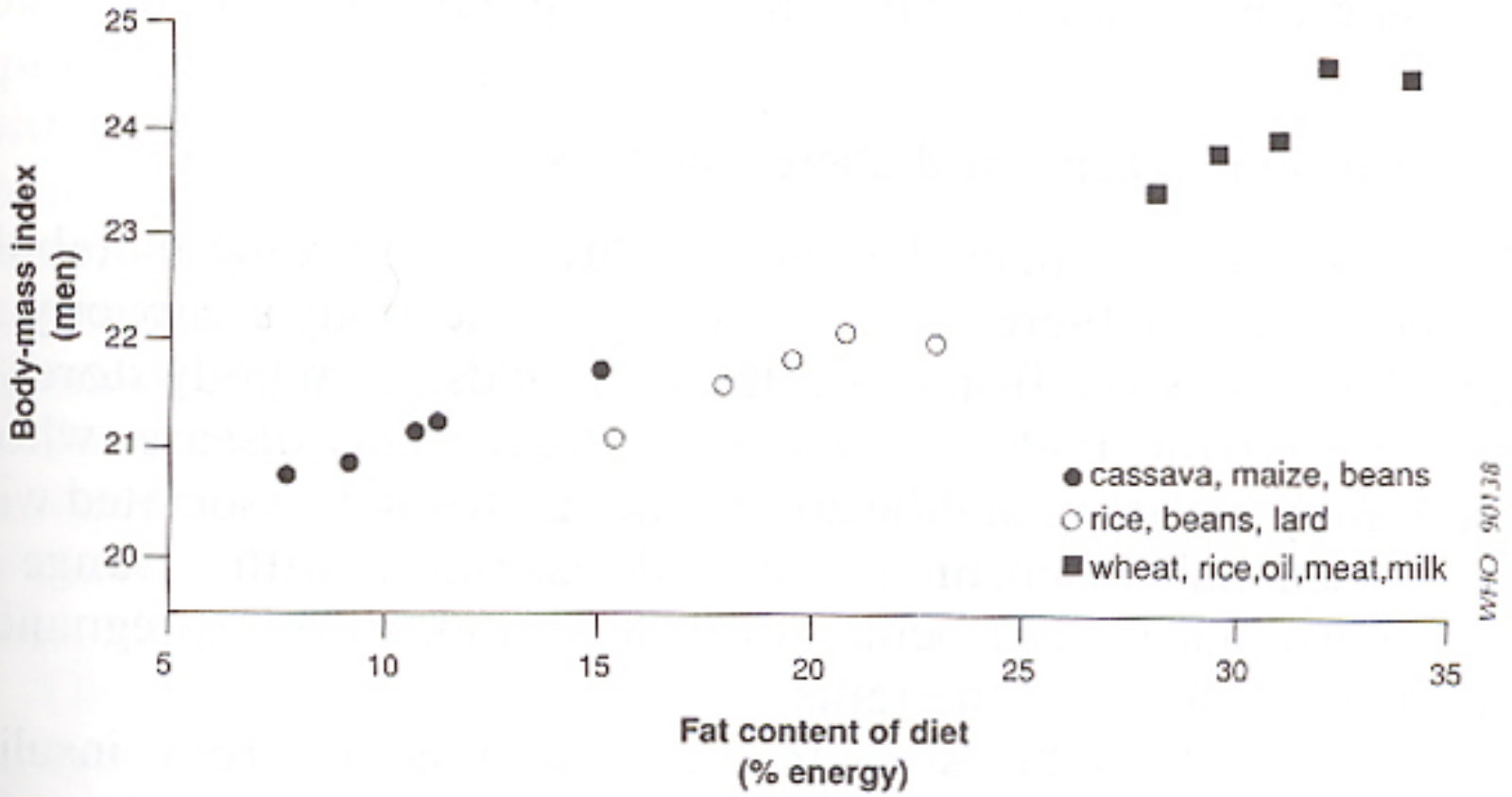
An individual

Inappropriate diet



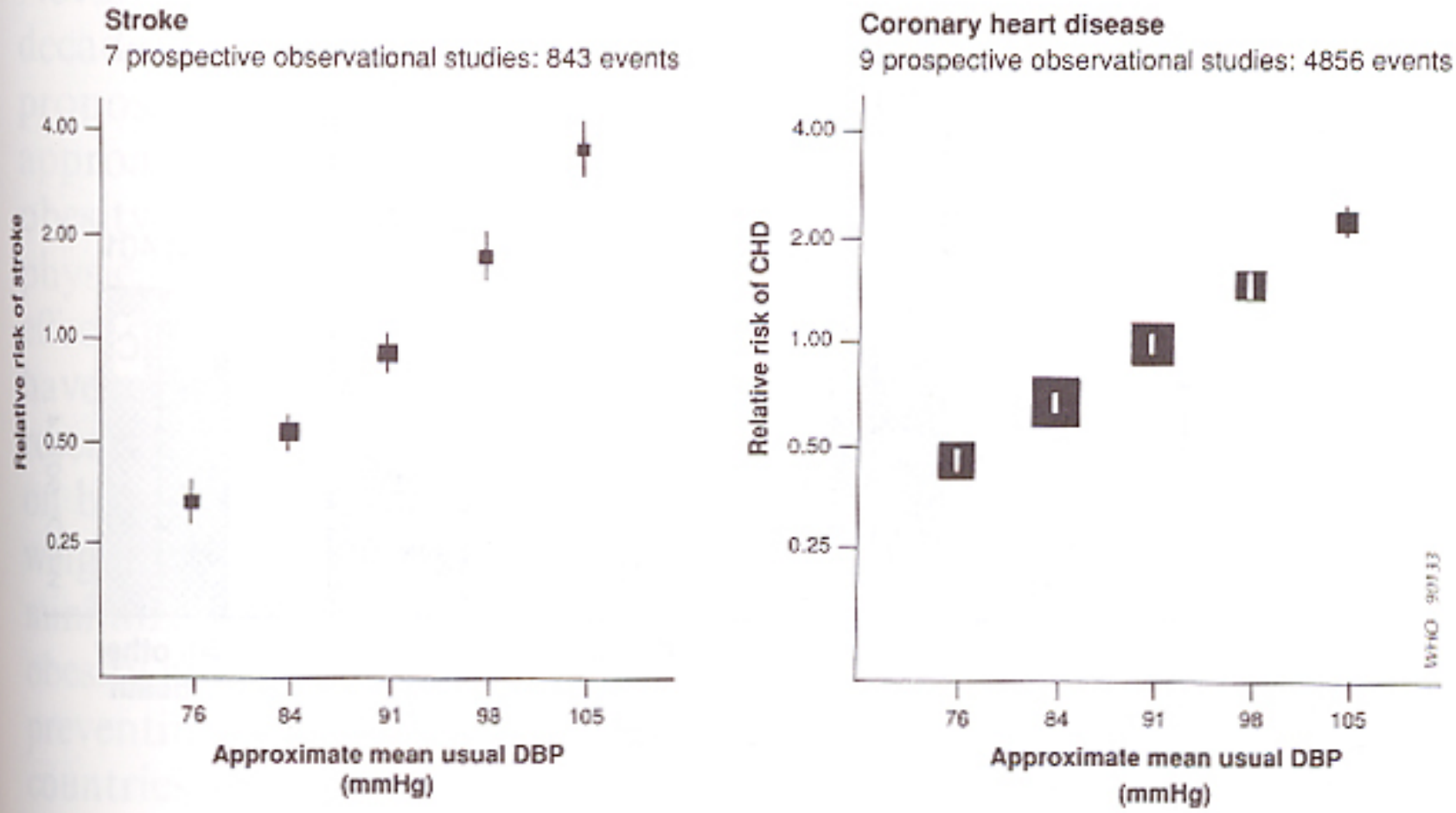
What is “inappropriate”?

Fig. 12. Household diet and adiposity in Brazil, according to dietary staples[a]



[a] Adapted from reference *56*. For each dietary pattern, the households studied were split into five groups according to average annual income, with ranges as follows: ●, US$ 99–418; ○, US$ 220–990; ■, US$ 1700–8500.

Fig. 7. Association between usual diastolic blood pressure (DBP) and risk of stroke and coronary heart disease[a, b]

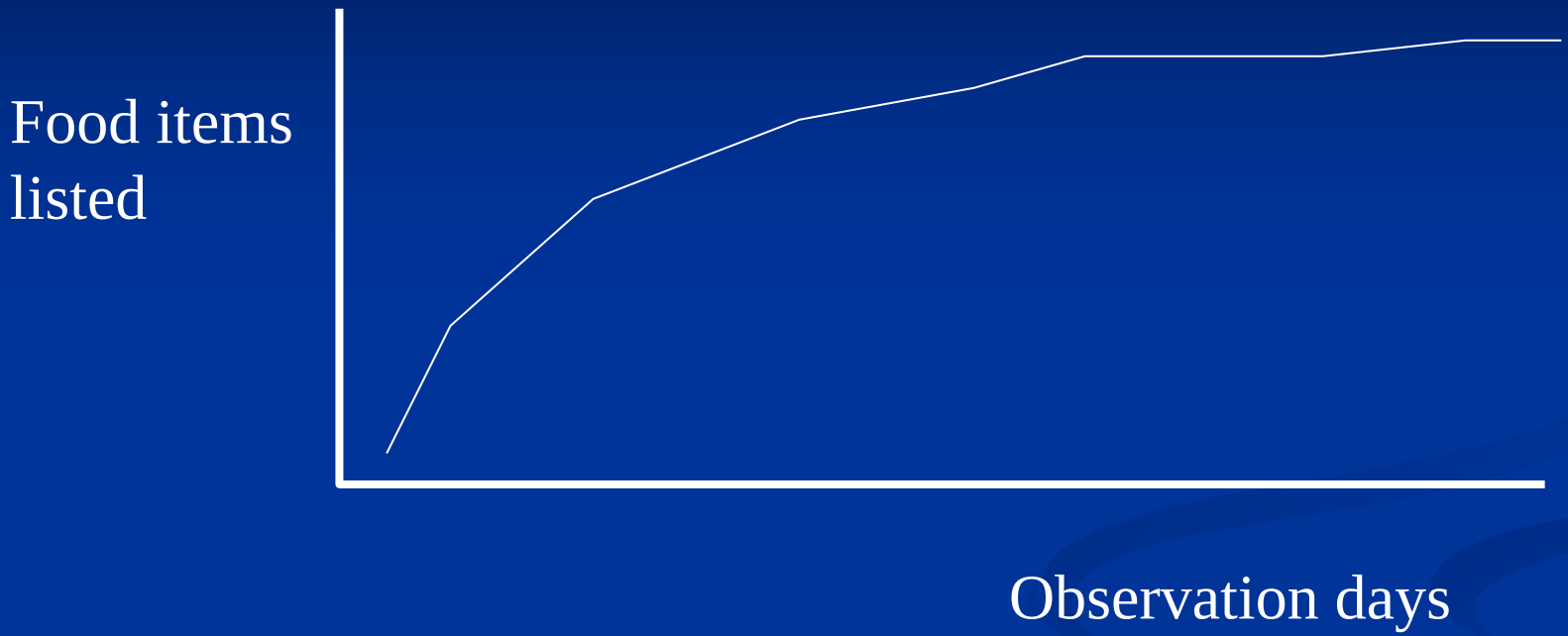


[a]The size of the boxes is proportional to the amount of information in each DBP category. The vertical lines denote 95% confidence limits. Values for mean usual DBP were estimated from later remeasurements in the Framingham study.

[b]Reproduced from reference *41*, by kind permission of the publisher.

Methodology

2/3. Food items and nutritional contents



1. Seasonality
2. Difference in nutrient contents
3. Food composition table

4. Food consumption

Direct measurement

- household/individual/community
- one day/one week/one year

Food frequency questionnaire

- usual food consumption pattern
- epidemiological study

24 hour recall

- epidemiological study
- 3 hour recall/6 hour recall etc

5. Energy and nutritional intake

Orange

Weight of food consumed
Edible portion
Energy and nutritional content of the food

Curry rice

Weight for each material
Edible portion for each material
Energy and nutritional contents of each material

Salt/sugar/oil

Time allocation study

- Individual tracing method
- Diary method
- Spot-check method
- Recall method

→Estimation of labor hours

6/7. Assessment of energy expenditure/nutritional status

Energy expenditure

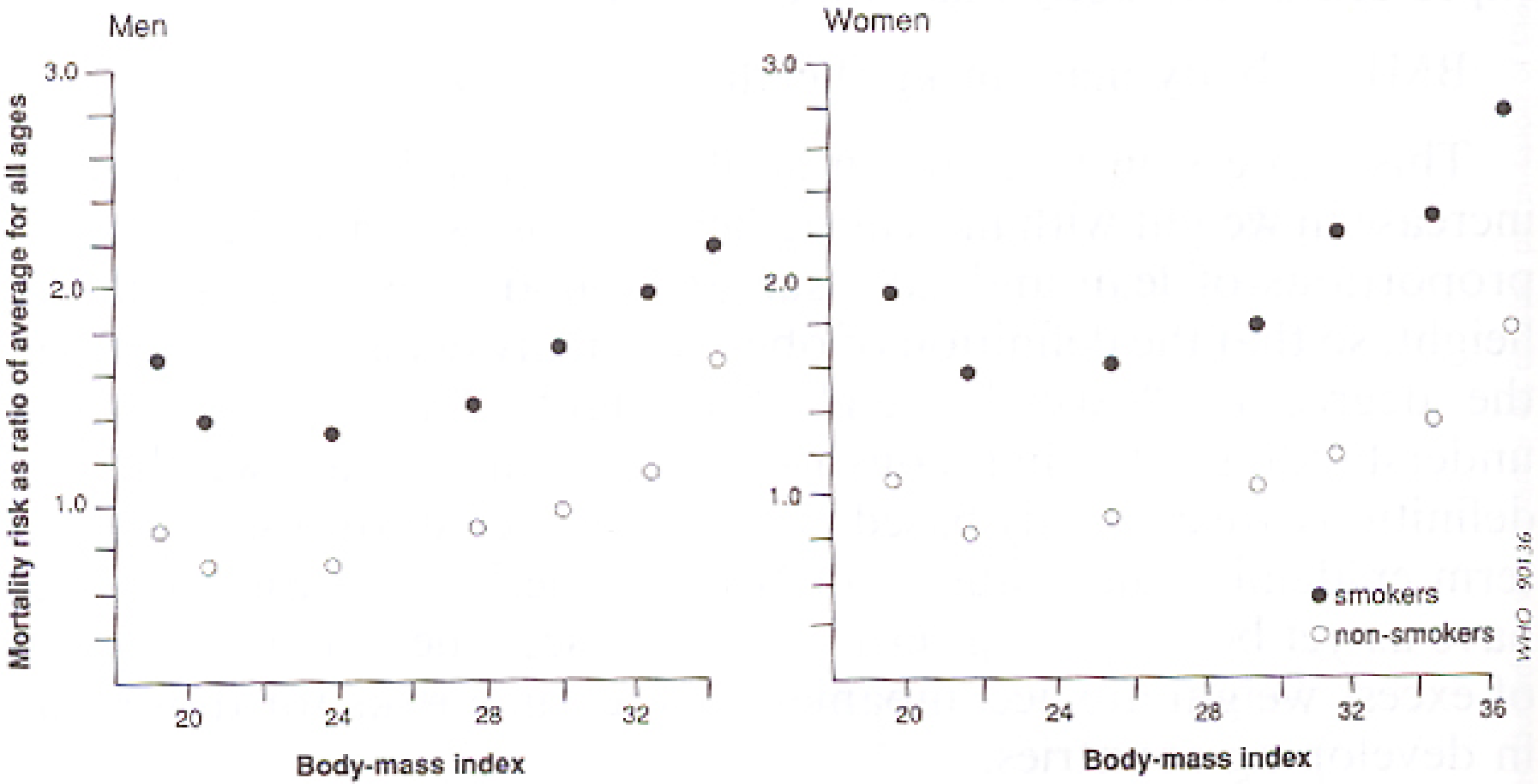
- Calorimeter
- Heart rate monitoring
- Accelorometer
- Time allocation

Nutritional status

- Anthropometric measurements
- Examination of blood sample

Cutoff point = - 2SD of CDC standard ??

Fig. 10. Body weight, smoking, and death rates for men and women[a]

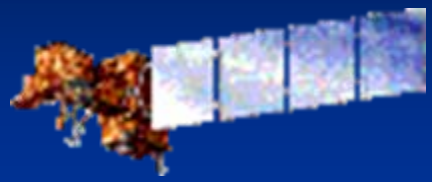


8. Assessment of health status

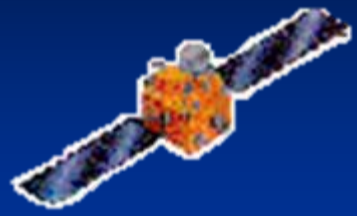
Mortality/fertility
Prevalence/incidence of diseases
Days with sick in a year
Examination of blood sample
Self-report

Remote sensing and GIS

Remote sensing satellites



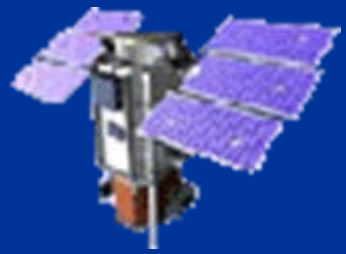
Landsat
(USA)
30m



IRS
(India)
24m

SPOT
(France)
10m

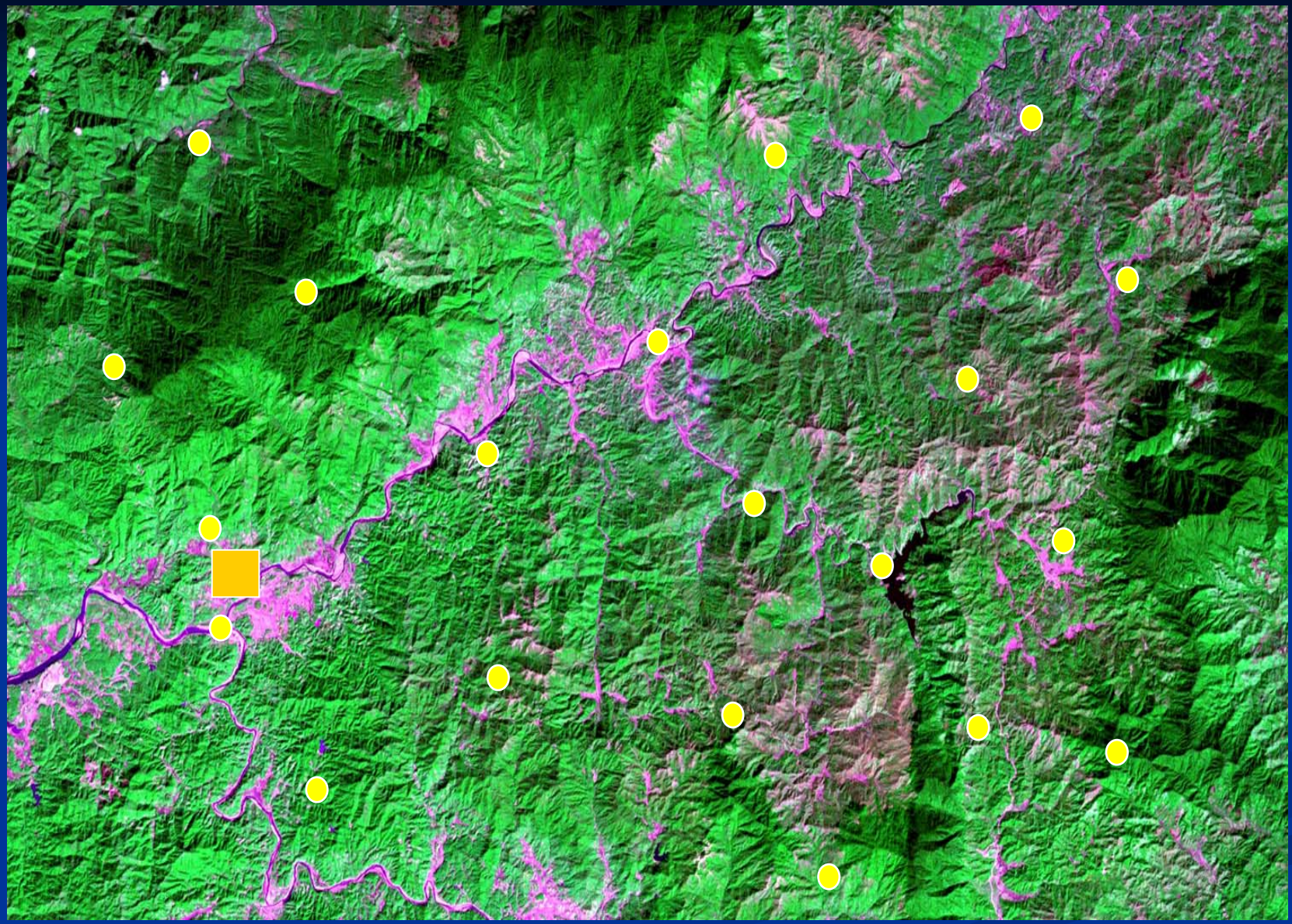
IKONOS
(USA)
3.3m



QUICKBIRD
(USA)
2.4m

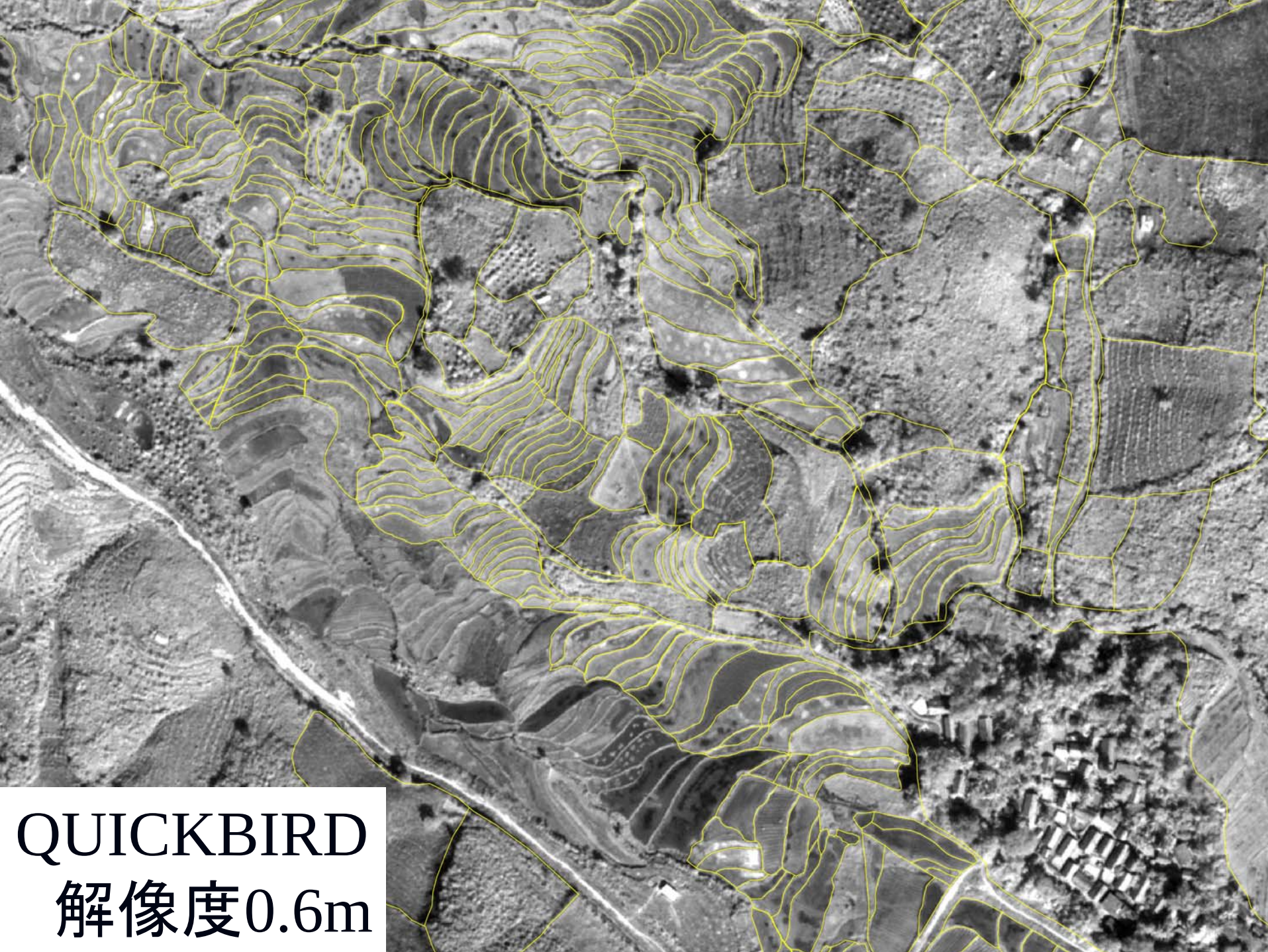
http://www.restec.or.jp/


GVI/FALSE & NDVI COLOR CODED IMAGE (1988)
GVI LEVEL/FALSE>CH1:12-83.CH2:19-88/NVI CO.COLOR>CH4:0-150-220-255
RESTEC



LANDSAT 解像度30m

Natural color: B3=red, B4=G, B2=B


QUICKBIRD
解像度0.6m

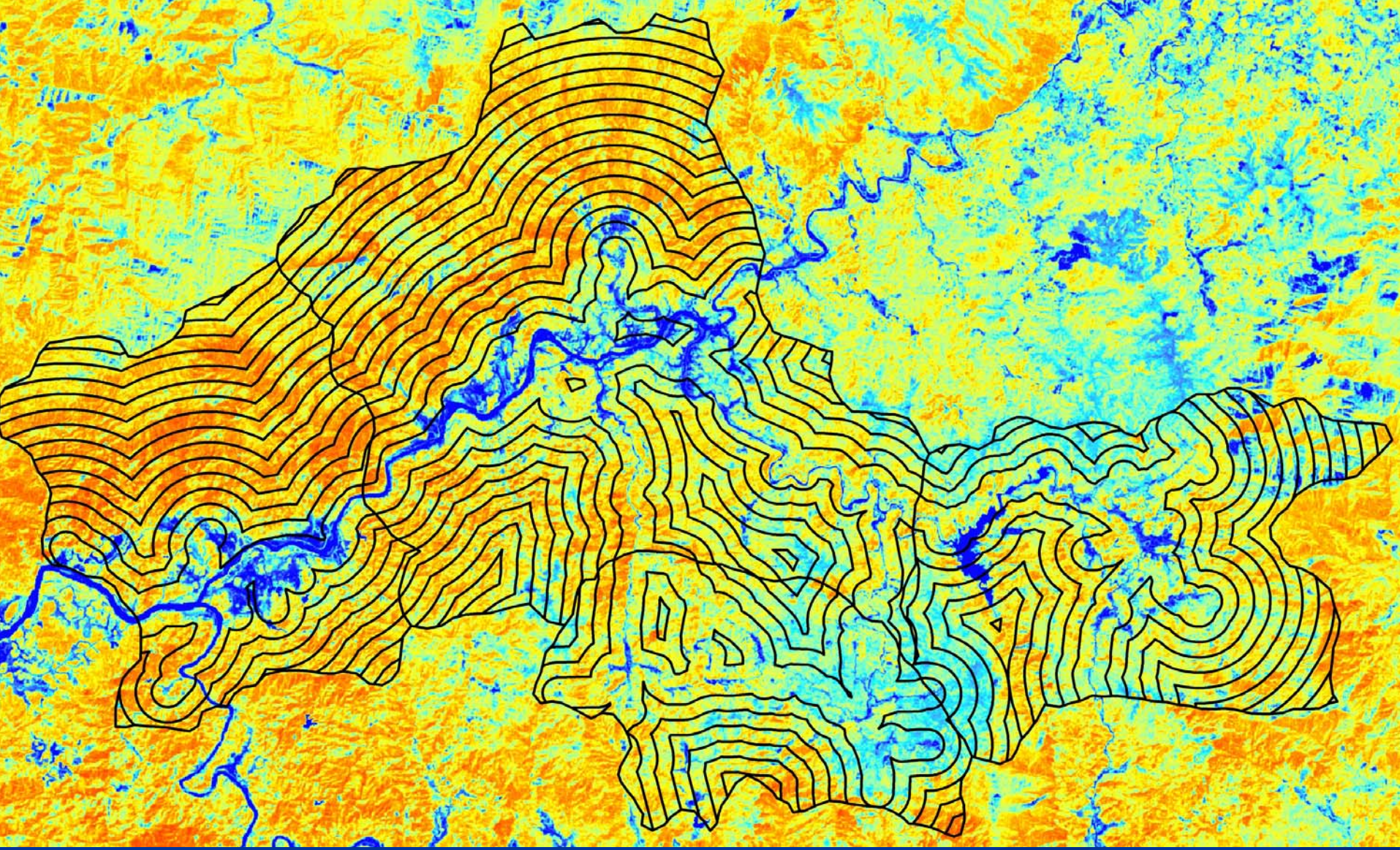
1 2 3 4 5 7 6

Vegetation Moisture Temp

Normalized differential vegetation index (NDVI)

（B4-B3）／（B4＋B3)

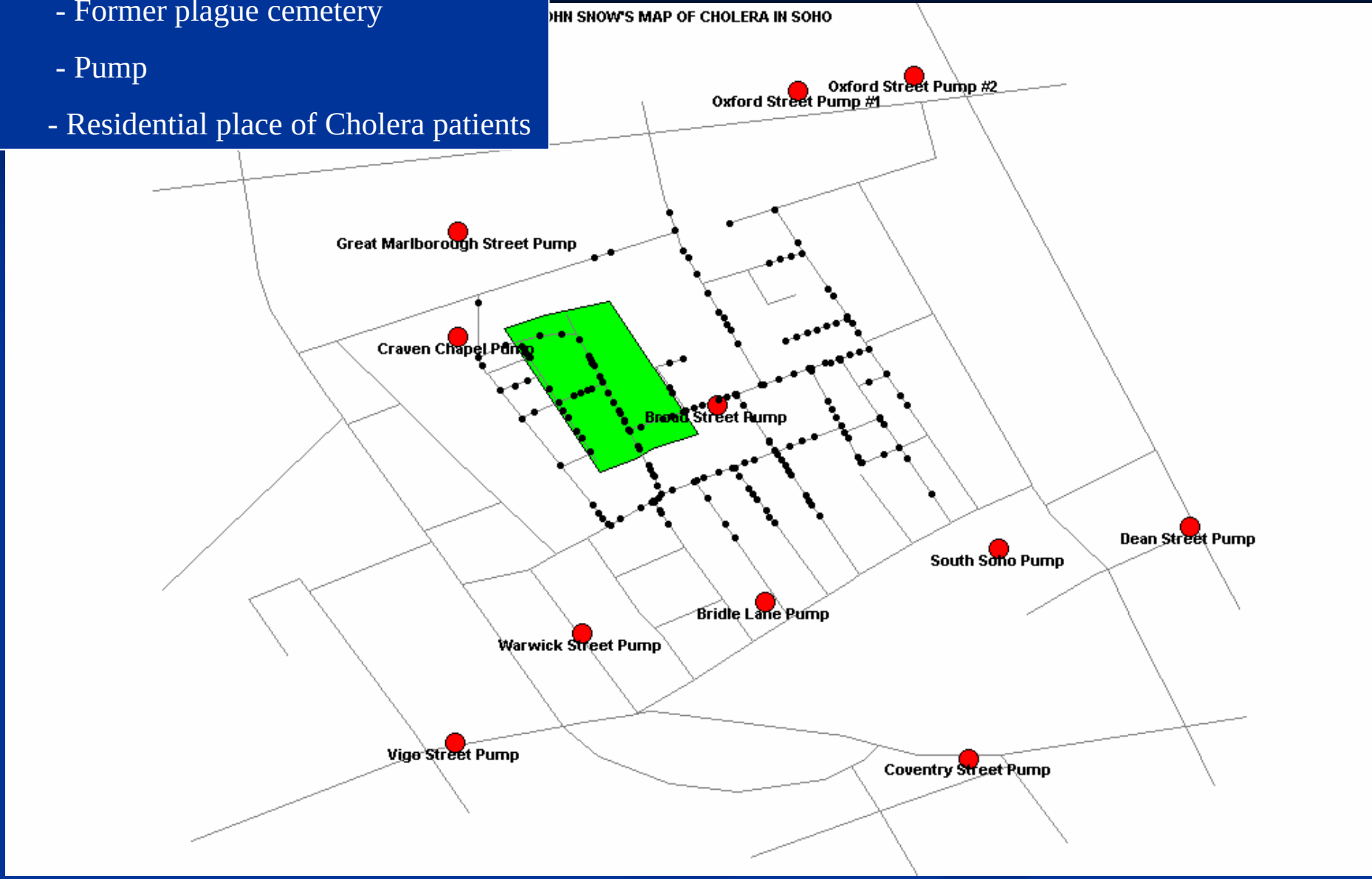
= proportional to the amount of chlorophyll



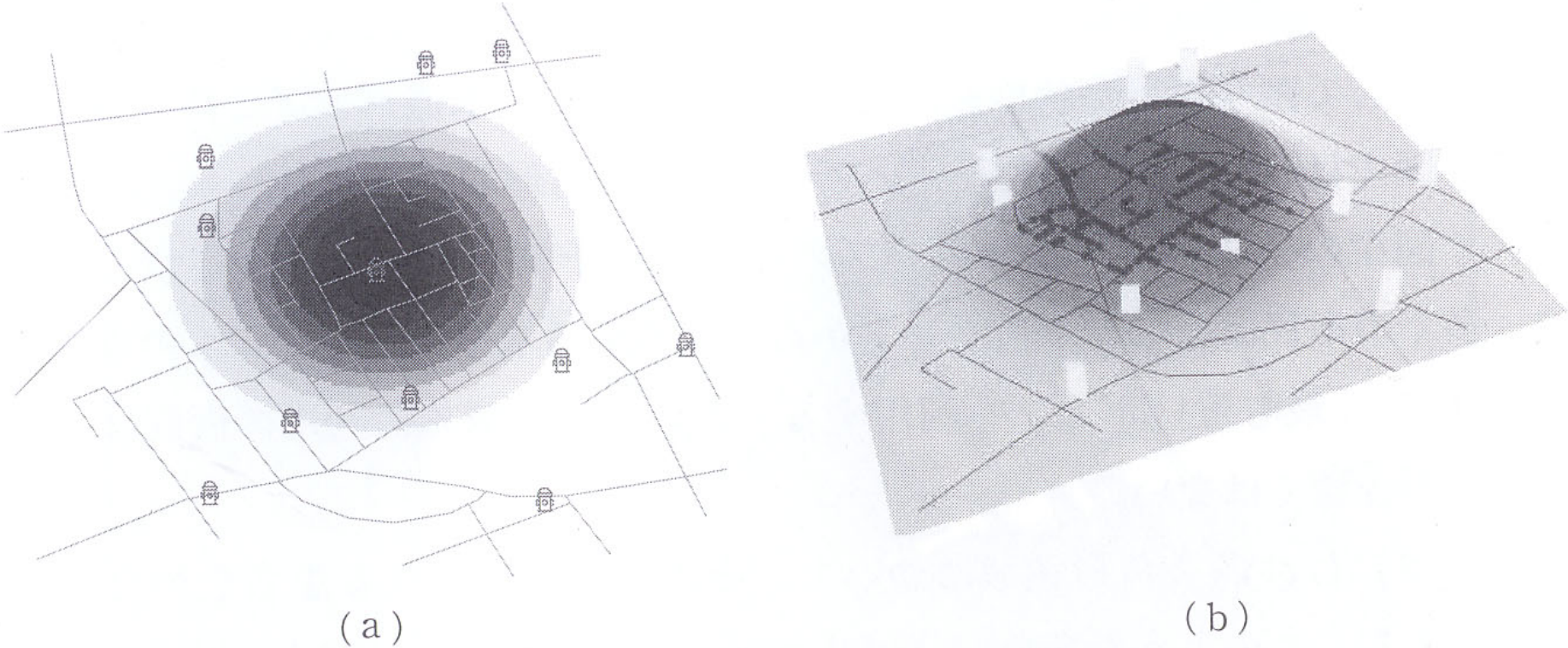
Vegetation index in 1999 and 500-m buffer from roads

Geographic information:

- Former plague cemetery
- Pump
- Residential place of Cholera patients



EpiInfo & EpiMap (free statistical package) : download from <http://www.cdc.gov>



Estimation of the source of infection

Nakaya (2001)

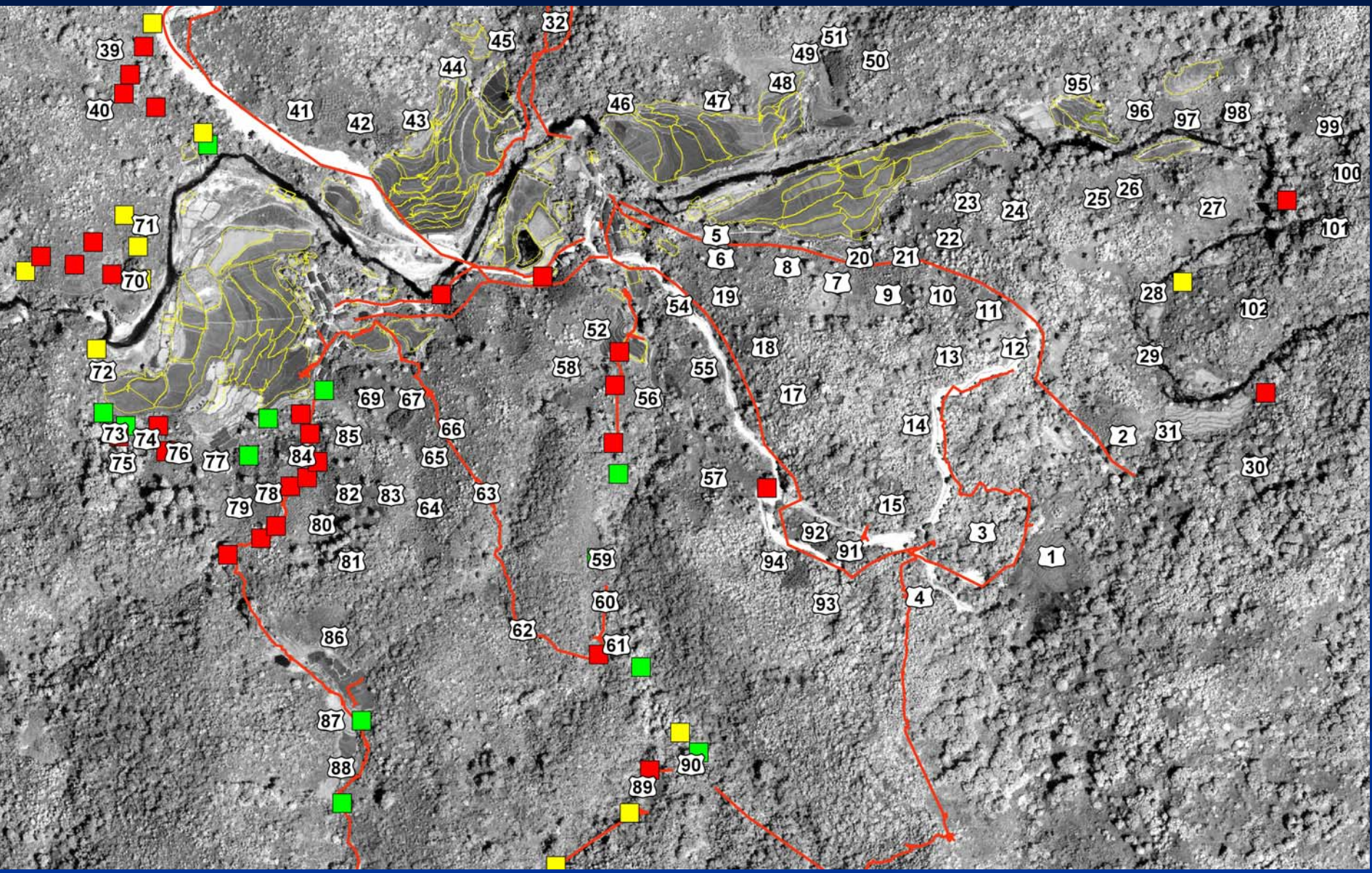
Map

Compass, measures

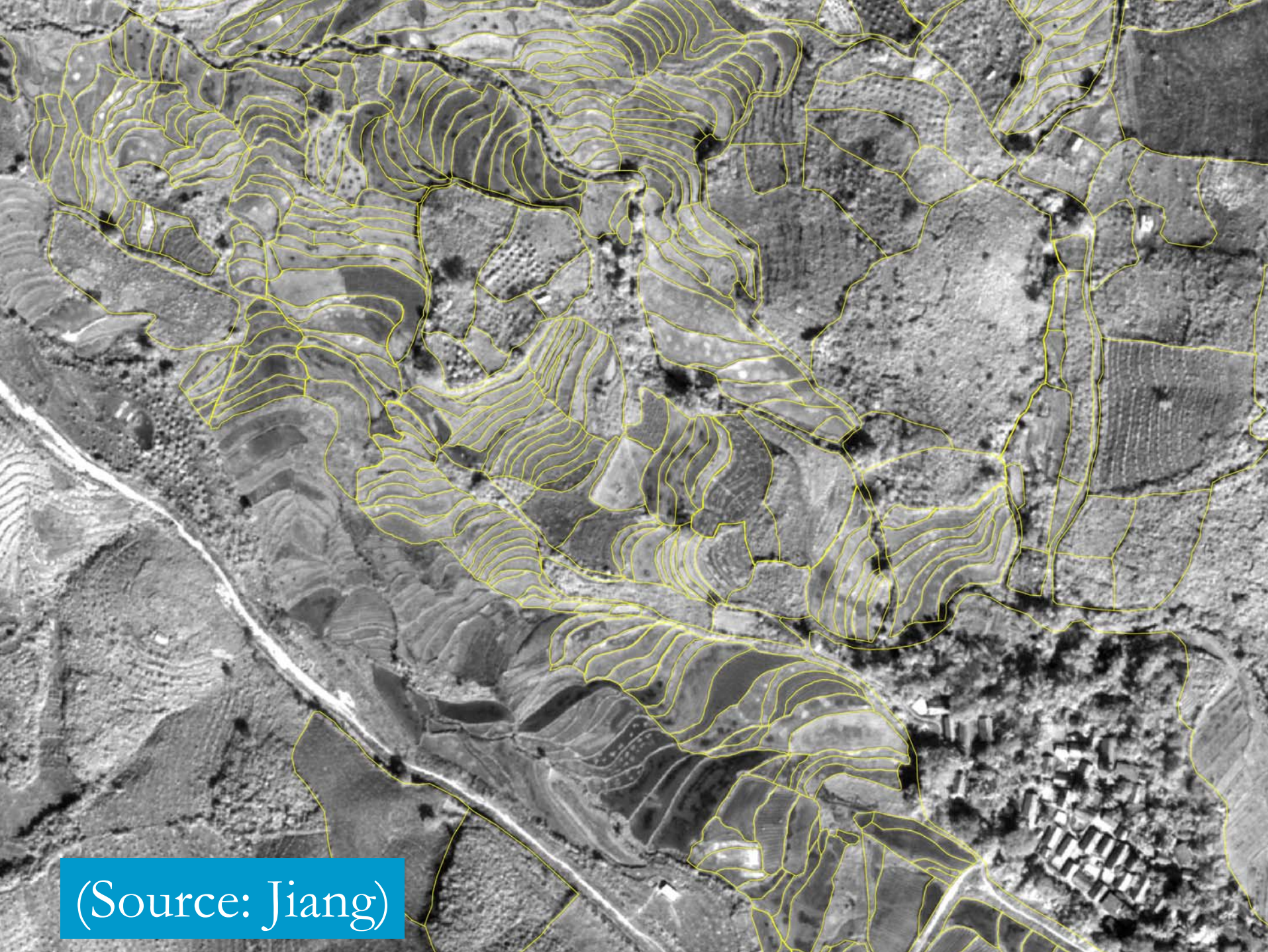
(Source: Umezaki)

Gardens plotted on satellite images

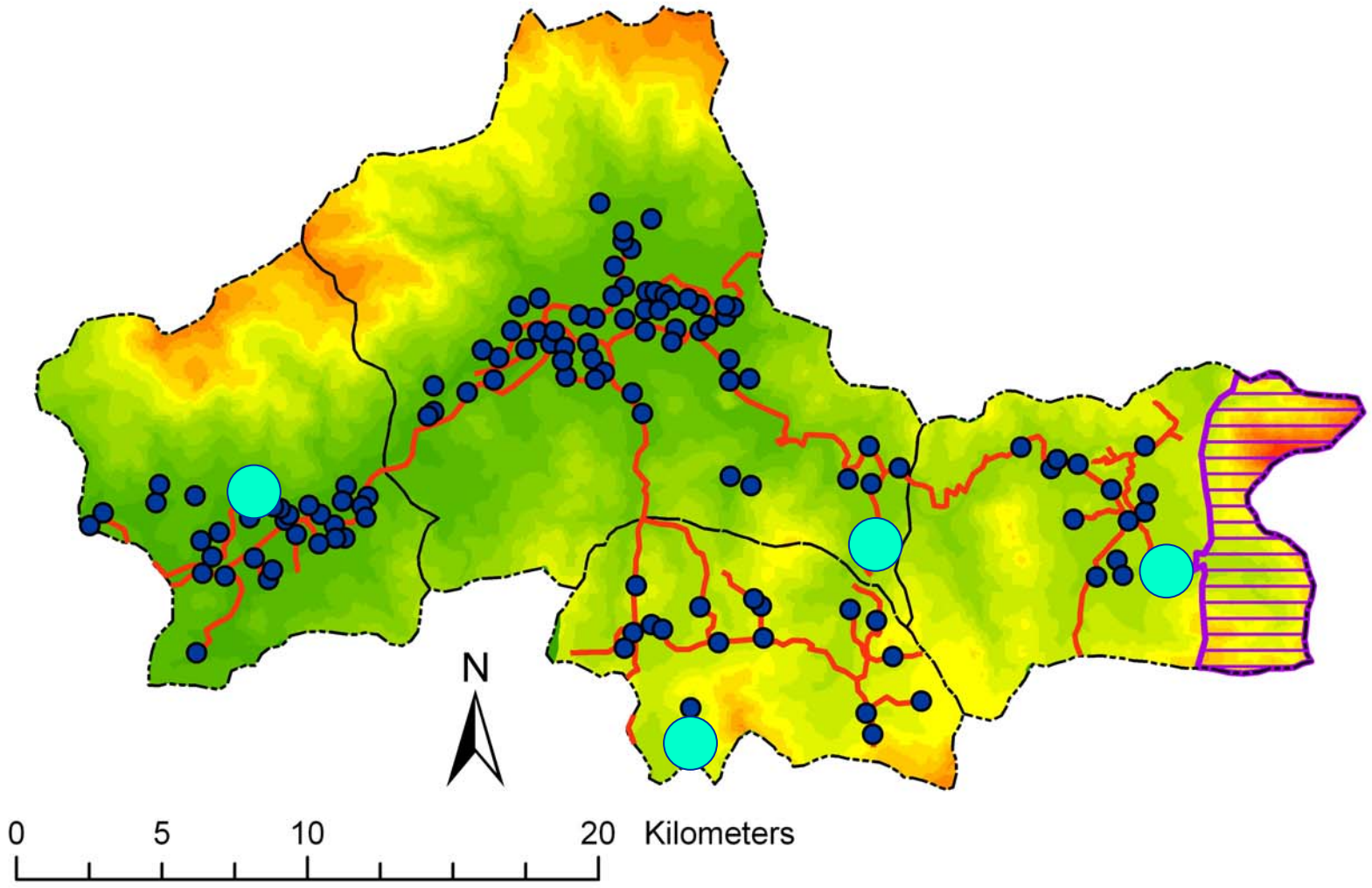
Satellite image＋GIS＋GPS

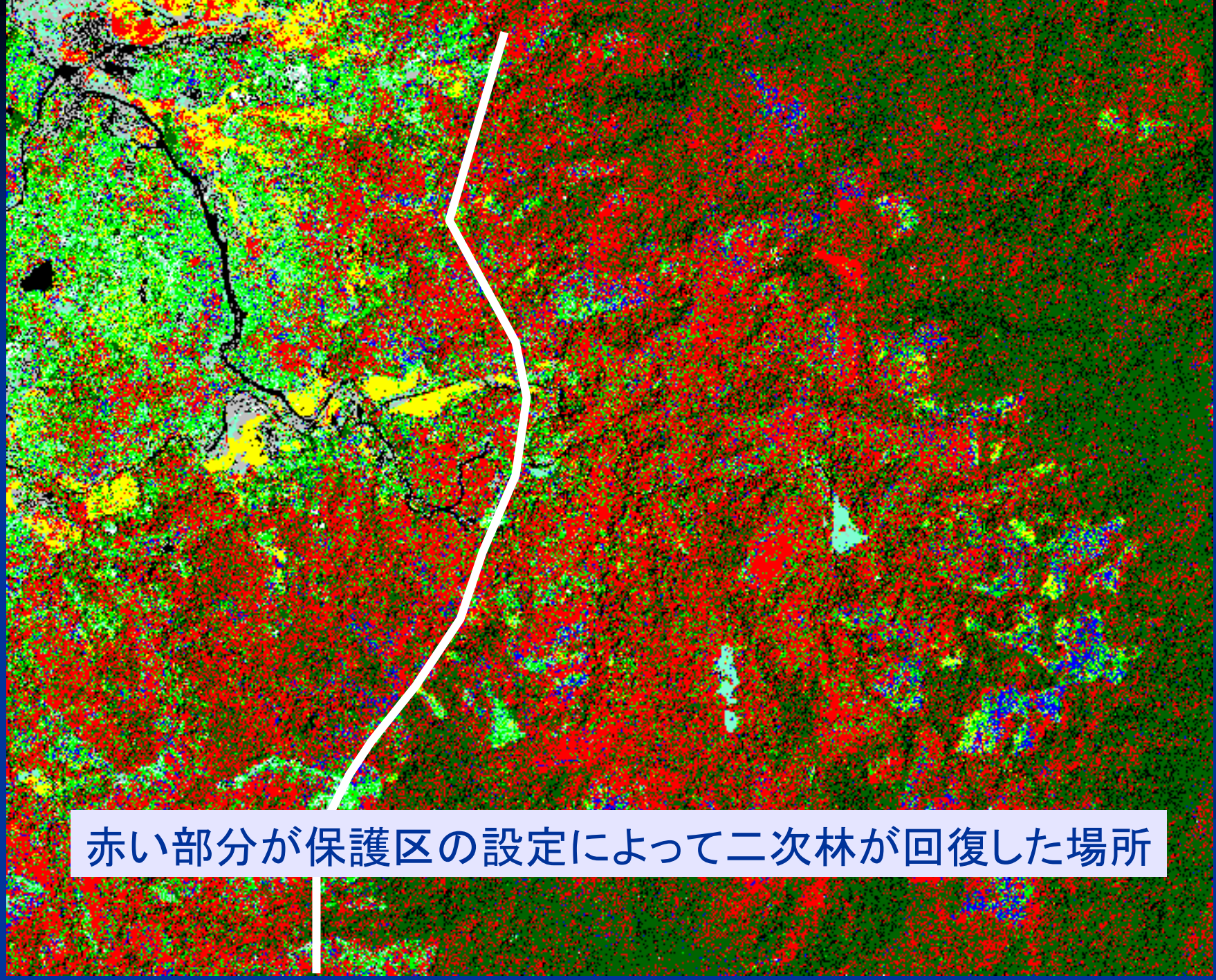


(Umezaki and Jiang, unpublished data)

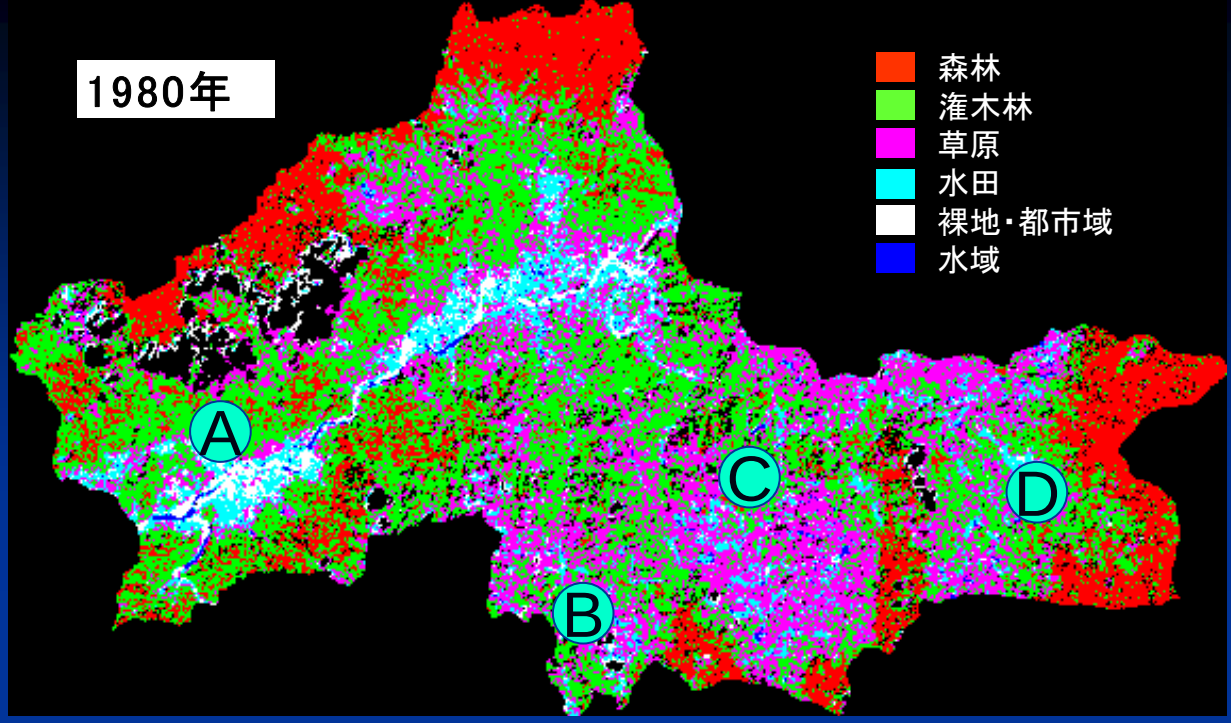

(Source: Jiang)

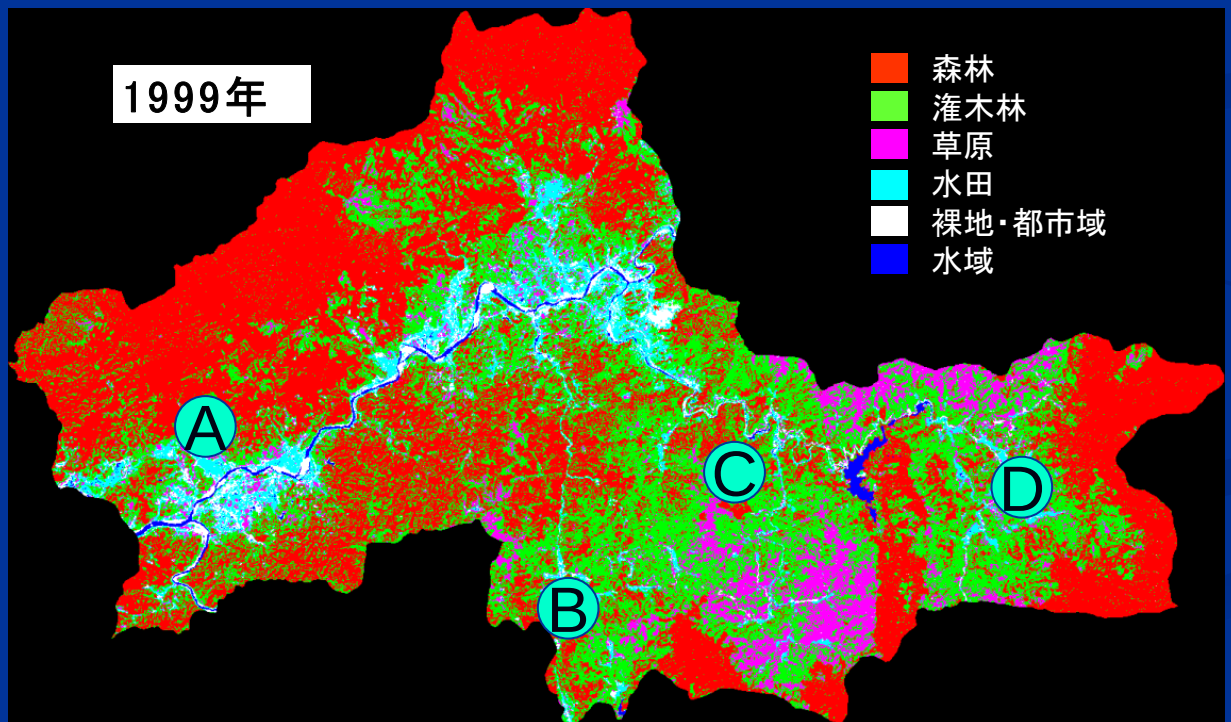
Land tenure displayed on GIS


N
0
5
10
20
Kilometers

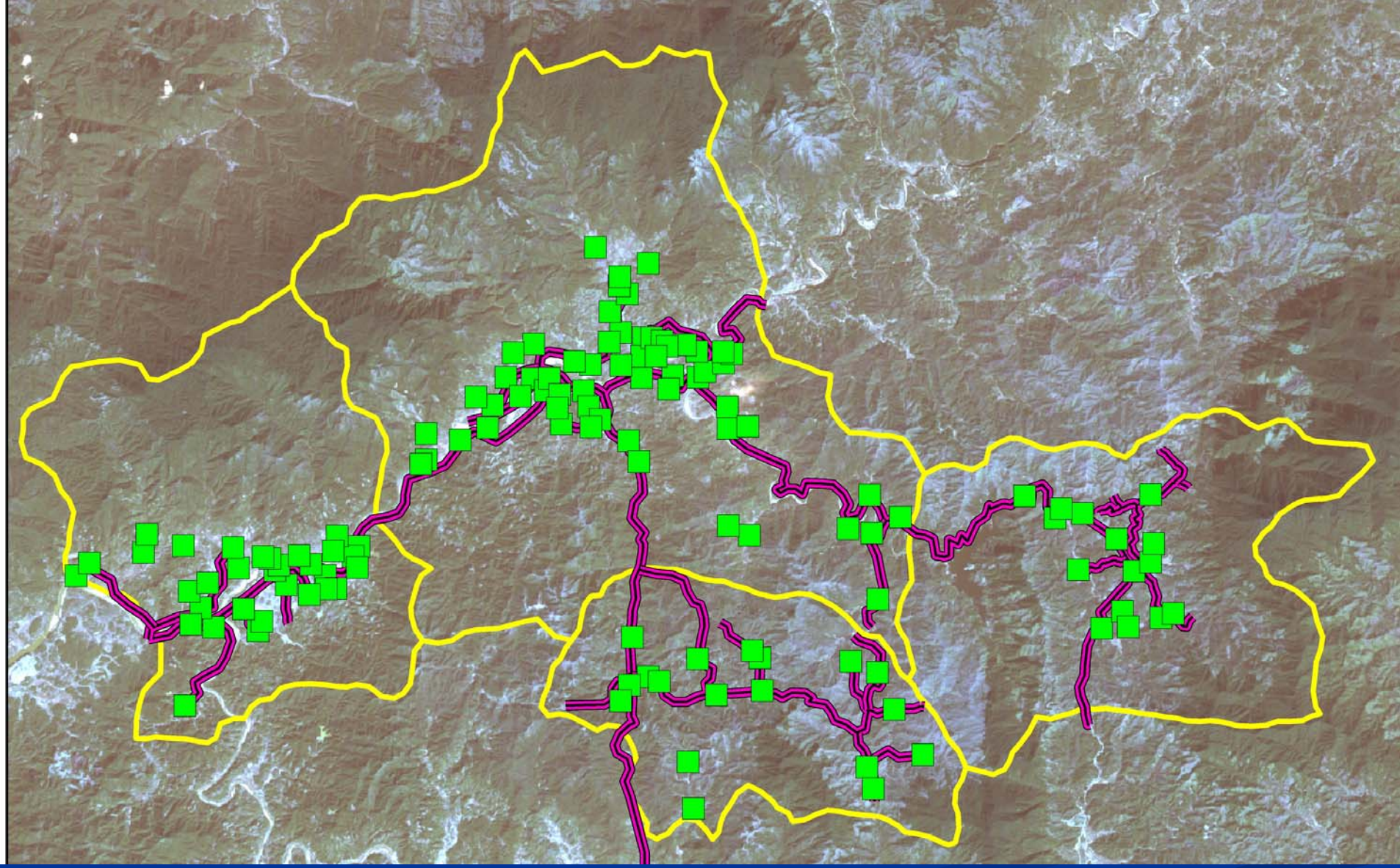


赤い部分が保護区の設定によって二次林が回復した場所

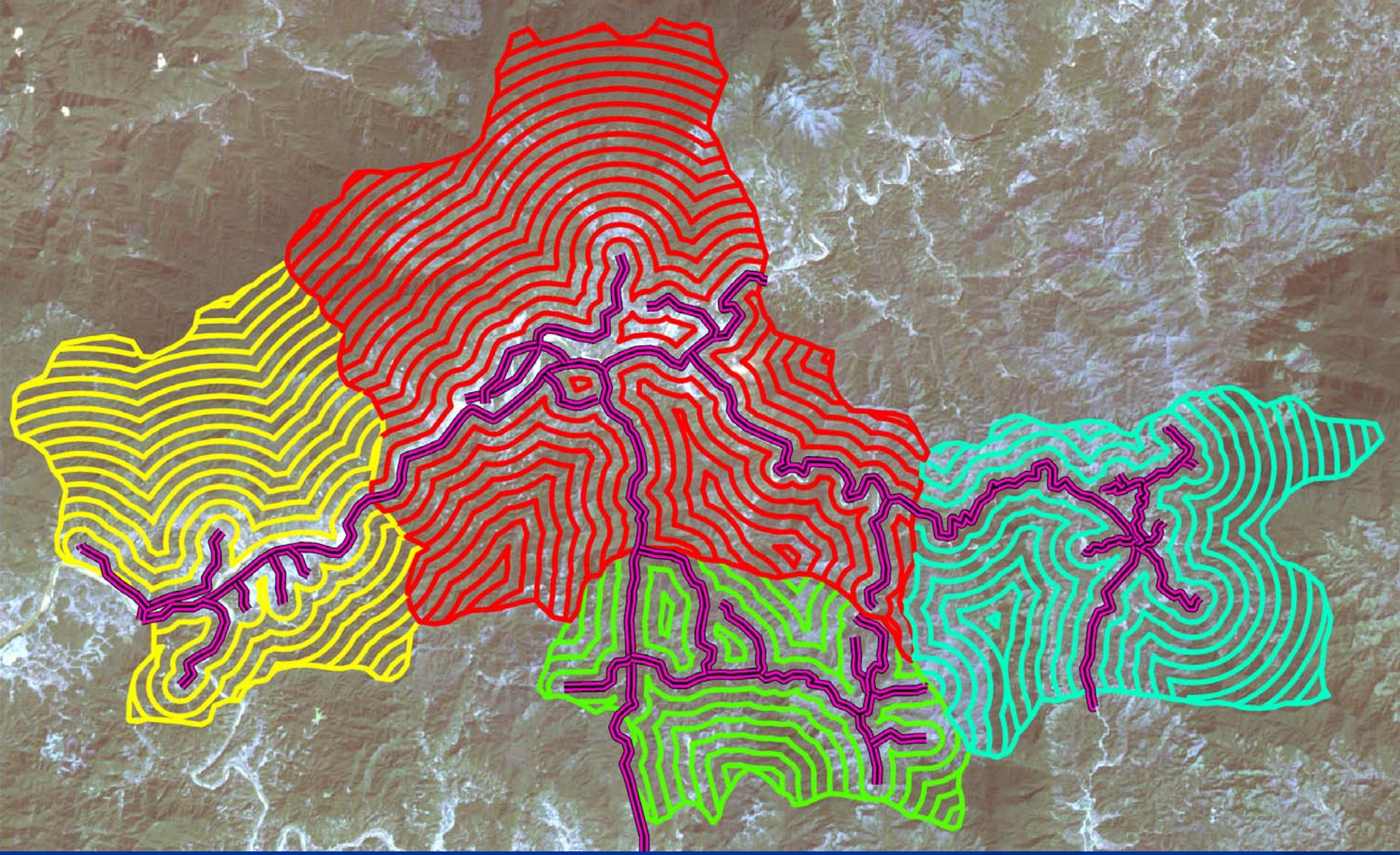




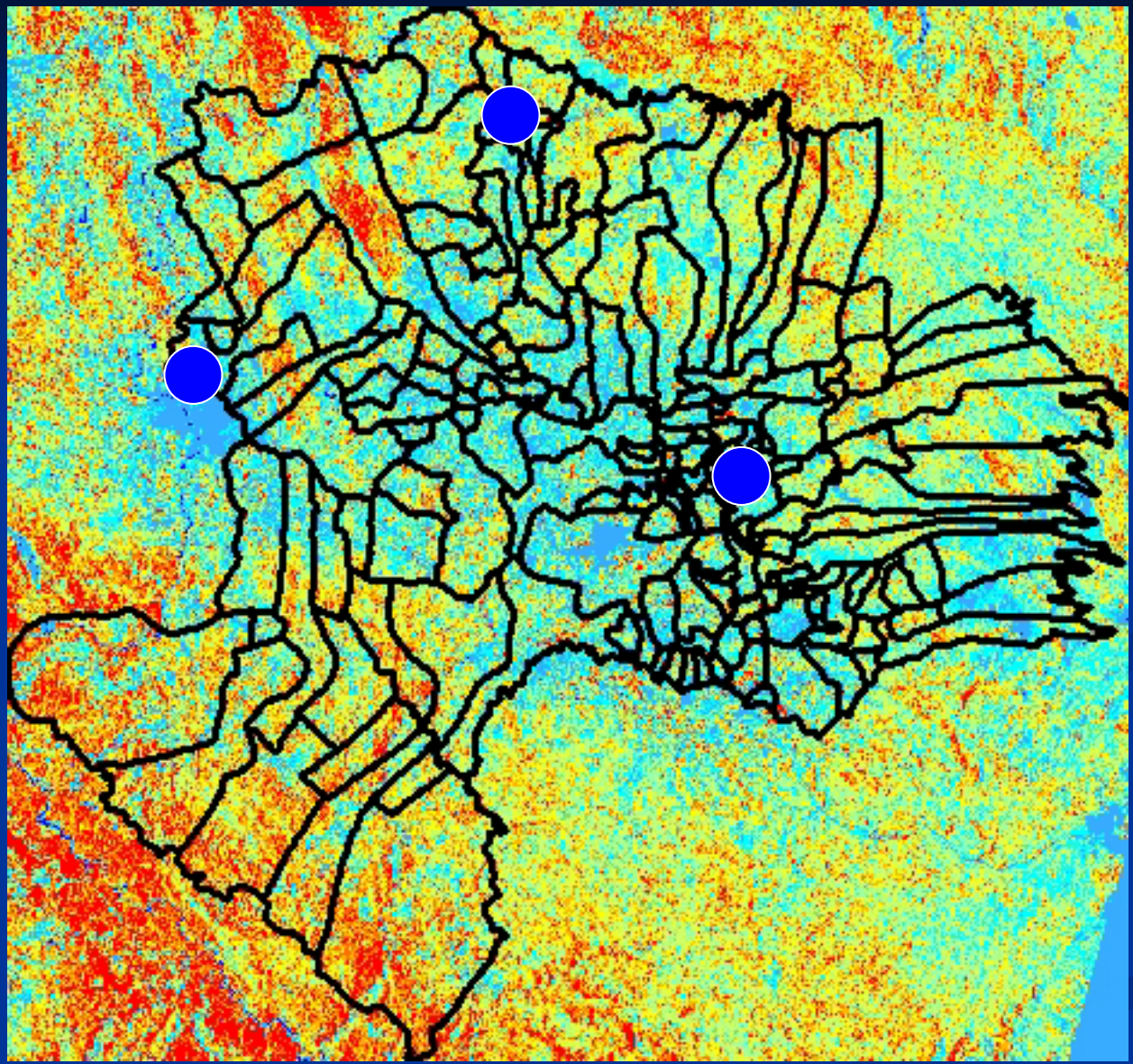
Land use change from 1980 to 1999



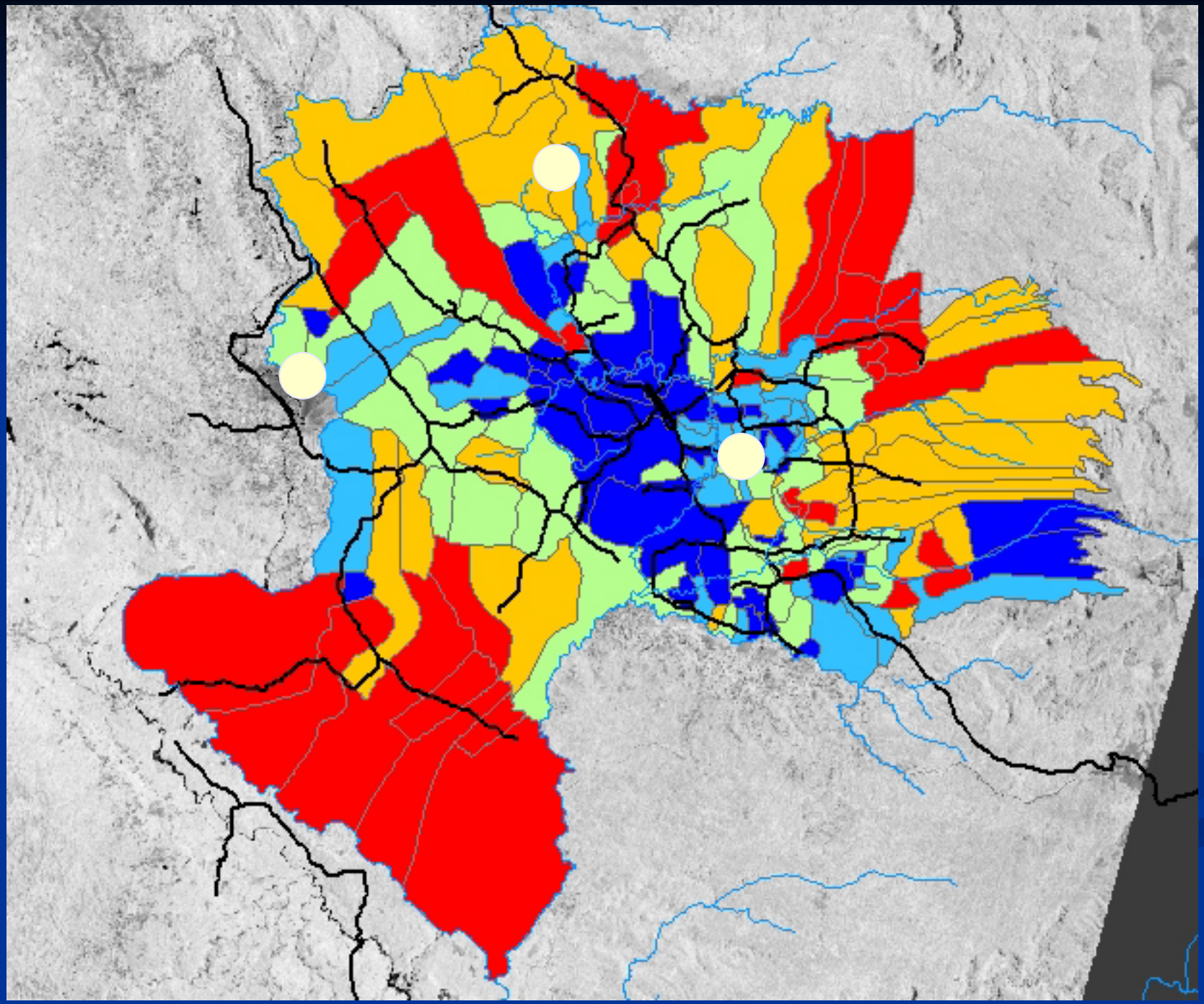
Administrative boundary, road, hamlets



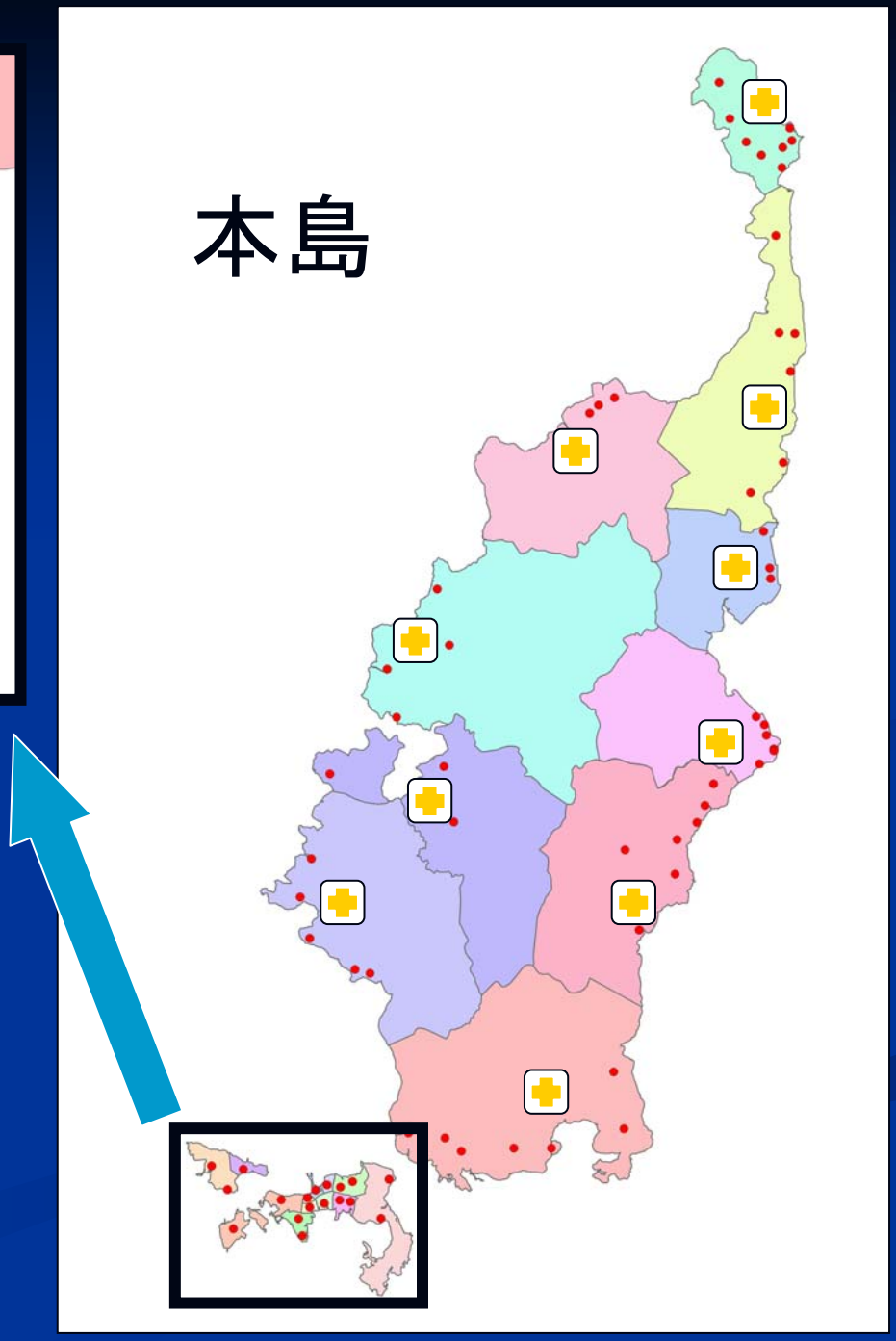
Buffers produced on the basis of road networks

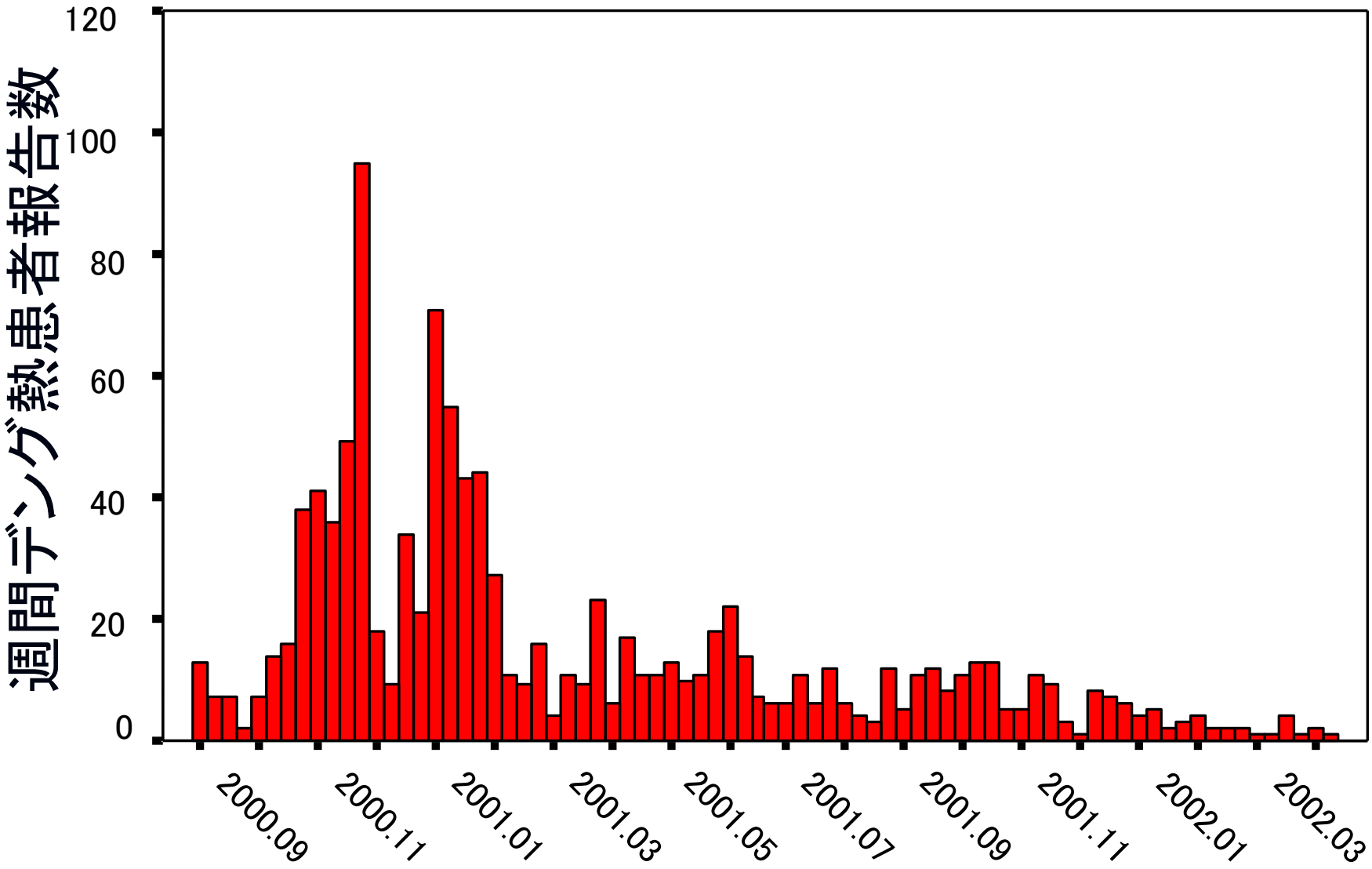


ランドサット衛生によるNDVI(植生指標）の計算結果

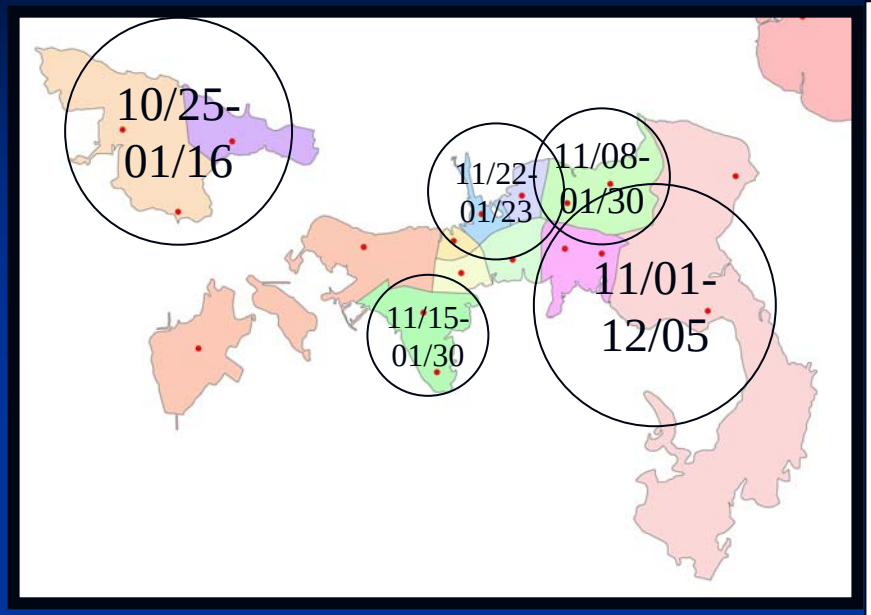


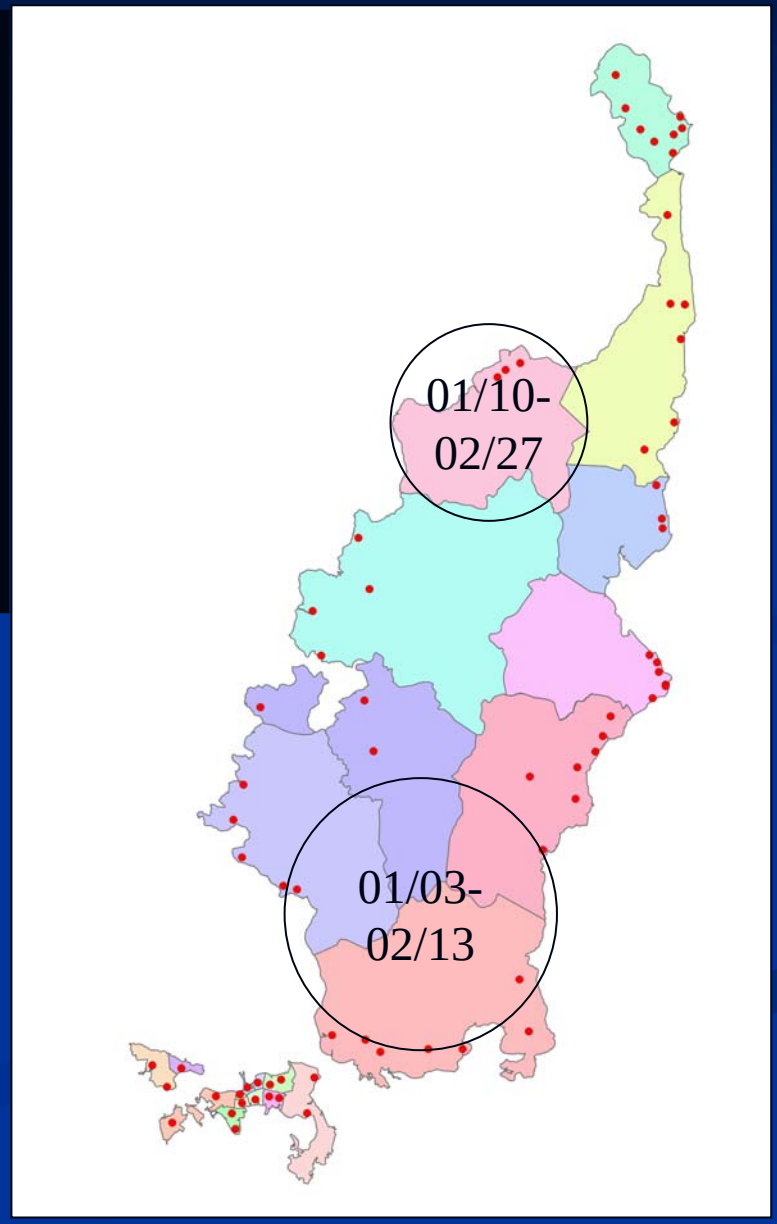

首都コロール


本島


週間デング熱患者報告数
120
100
80
60
40
20
0
2000.09
2000.11
2001.01
2001.03
2001.05
2001.07
2001.09
2001.11
2002.01
2002.03

パラオにおけるデング熱のアウトブレイク:いつ？どこで？





Study period: 2000/09/01-2002/12/31
Number of census area: 25
Total population: 19067
Total cases: 926
Max spatial cluster size: 10%
Max temporal cluster size: 10%
Number of replications: 999