3-4 Surveys carried out in this project

3-4-1 Interpretation of satellite images and aero-photographs

Satellite images and aero-photographs are useful means of examining the physical conditions (landform, geology, surface water, vegetation, etc.) of vast areas. They are particularly valuable in surveying flat relief areas without precise topographical maps like Africa.

In this project, satellite images and aero-photographs were interpreted to identify appropriate sites for subsurface dams.

(1) Landforms considered as appropriate sites for the subsurface dam
In the interpretation of satellite images and aero-photographs, the following landforms were considered:

1) Landforms suggesting the potential presence of fossil valleys: These are landforms with excessively wide flood plains, whose line is similar to that of the current rivers (*wadis*, in many cases), compared with the discharge of current rivers (*wadis*).
2) Ring-shaped landforms: These are landforms whose ridges range in a ring shape with a gapped part due to denudation. These landforms are often observed in the area of volcanic rock. Groundwater recharged with rainfall within these landforms converges at the gapped part.
3) Bottleneck-shaped landforms: These are landforms with a bottleneck part of the basement rock, buried by unconsolidated sediment, possibly accompanied by underflow water.

(2) Procedure for interpretation
First, false color photographs on a scale of 1/200,000 or 1/500,000 were made from LANDSAT TM (Thematic Mapper) images covering the central or the northern part of Burkina Faso. On the basis of the interpretation of these satellite images, 13 sites were identified as having potential geomorphological and geological structures appropriate for a subsurface dam.

Next, preliminary exploration in a large area including these 13 sites was carried out. As a result, 6 sites were selected, excluding sites with the following problems:

- Estimation of the underground structure was difficult, or the scale of the underground structure was too large for the model project.
- Access from the capital, Ouagadougou, was too difficult.
- Many other projects already existed.

Detailed landform classification maps were then drawn from black and white aero-photographs on a scale of 1/20,000 or 1/50,000 that covered the selected 6 sites. As the result of this process, 6 sites were narrowed down to 5.

It is recommended that aero-photographs be used for the interpretation of limited areas because the resolution of the LANDSAT images is low and the geomorphological and geological structures interpreted from them tend to be biased toward larger ones.

(3) Results of the selection of possible sites

The results of the selection of possible sites for a subsurface dam by the interpretation of the satellite images and aero-photographs and preliminary exploration are summarized in Table 3.1.

Table 3.1: Results of the selection of possible sites for a subsurface dam by the interpretation of satellite images and aero-photograph and preliminary exploration

Regions preselected from LANDSAT images			Results of preliminary exploration (Reason for rejection)	Results of interpretation of aero-photographs (Reason for rejection)
Name of province	Name of village	Checked landform		
Oudalan	Saouga	Fossil valley	Possible	Possible
Seno	North of Dori	Fossil valley	Impossible (The zone could not be identified.)	—
Seno	Yakouta	Fossil valley	Impossible (The structural scale was too large.)	—
Seno	Gangaol	Fossil valley - *wadi*	Possible	Impossible (The catchment area was too small.)
Namentenga	Nare	Fossil valley	Possible	Possible
Sanmatenga	Kouloga	Bottleneck	Impossible (The unconsolidated sediment layer might be too thin.)	—
Sanmatenga	Louda	Ring-shaped	Possible	Possible
Sanmatenga	Bassneile	Ring-shaped	Possible	Possible
Sanmatenga	Tangapore	Bottleneck	Possible	Possible
Sanmatenga	Balou	Bottleneck	Impossible (Poor access)	—
Sanmatenga	Santabe	Bottleneck	Impossible (Poor access)	—
Bam	Around Loga	Ring-shaped	Impossible (Many projects had already existed.)	—
Yatenga	North of Gongoure	Bottleneck	Impossible (Poor access)	—
Yatenga	North of Ban	Special reason *	Impossible (Poor access)	—

Note: It was requested by S.P.CONAGESE that the subsurface dam be constructed here because of the threat of forest extinction.

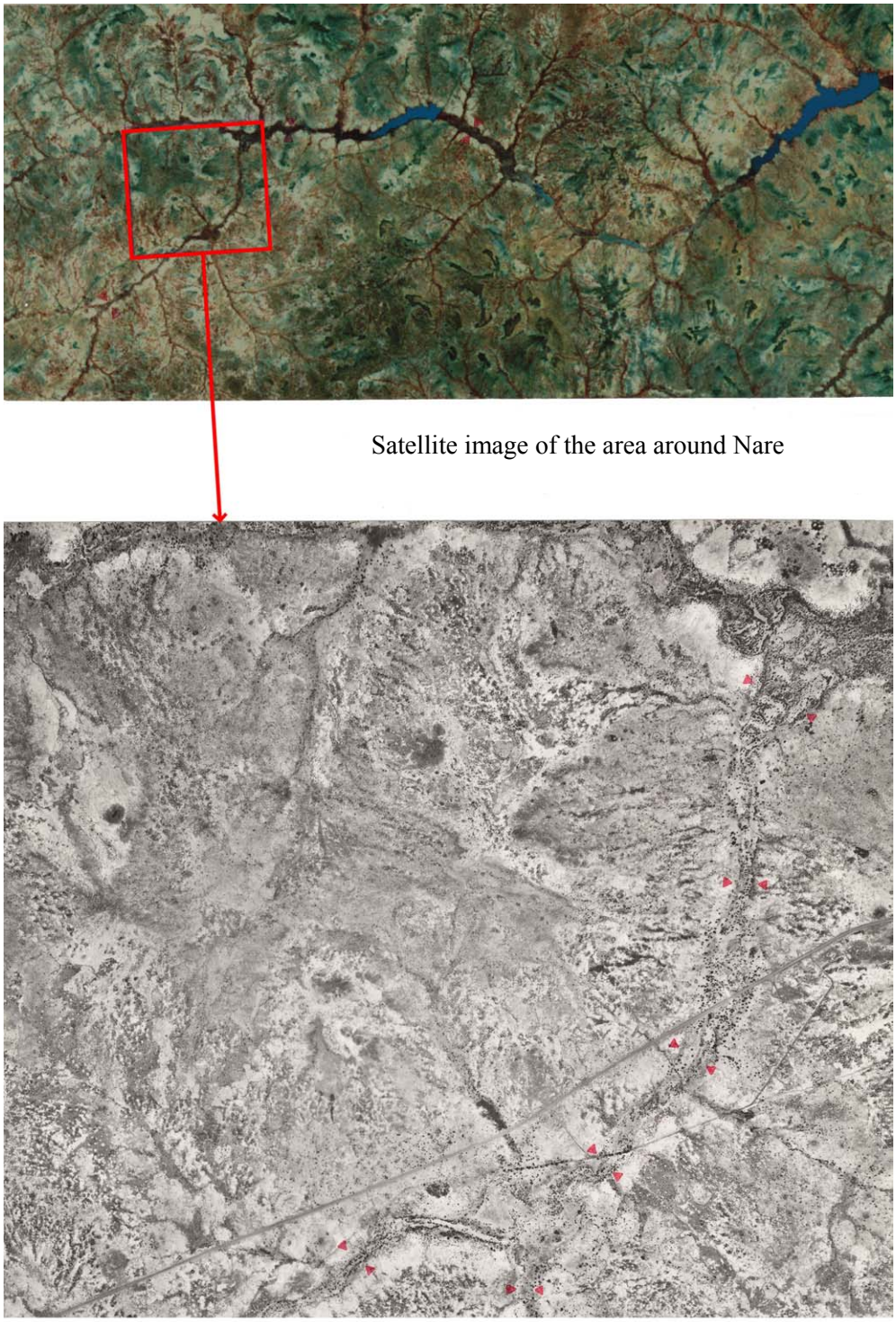

Fig. 3.3: Satellite image and aero-photograph of the "fossil valley"

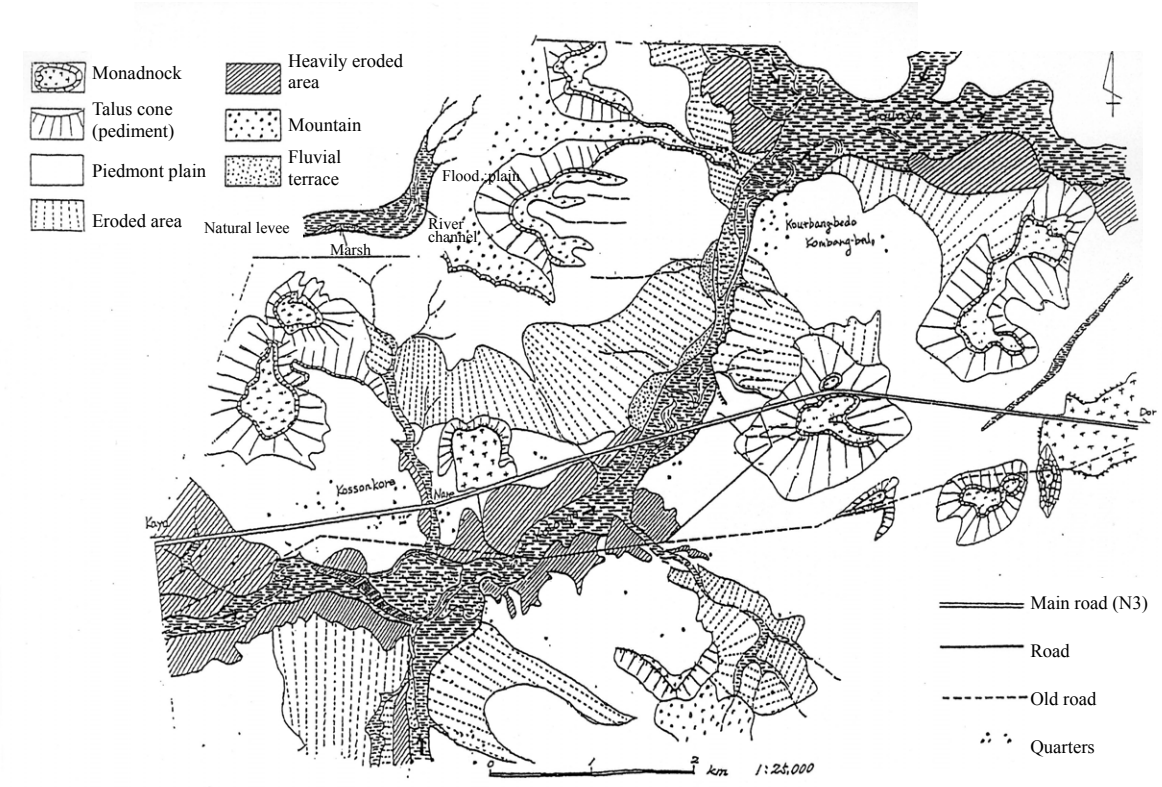

Fig. 3.4: Sample of landform classification maps based on aero-photographs (area around Nare)