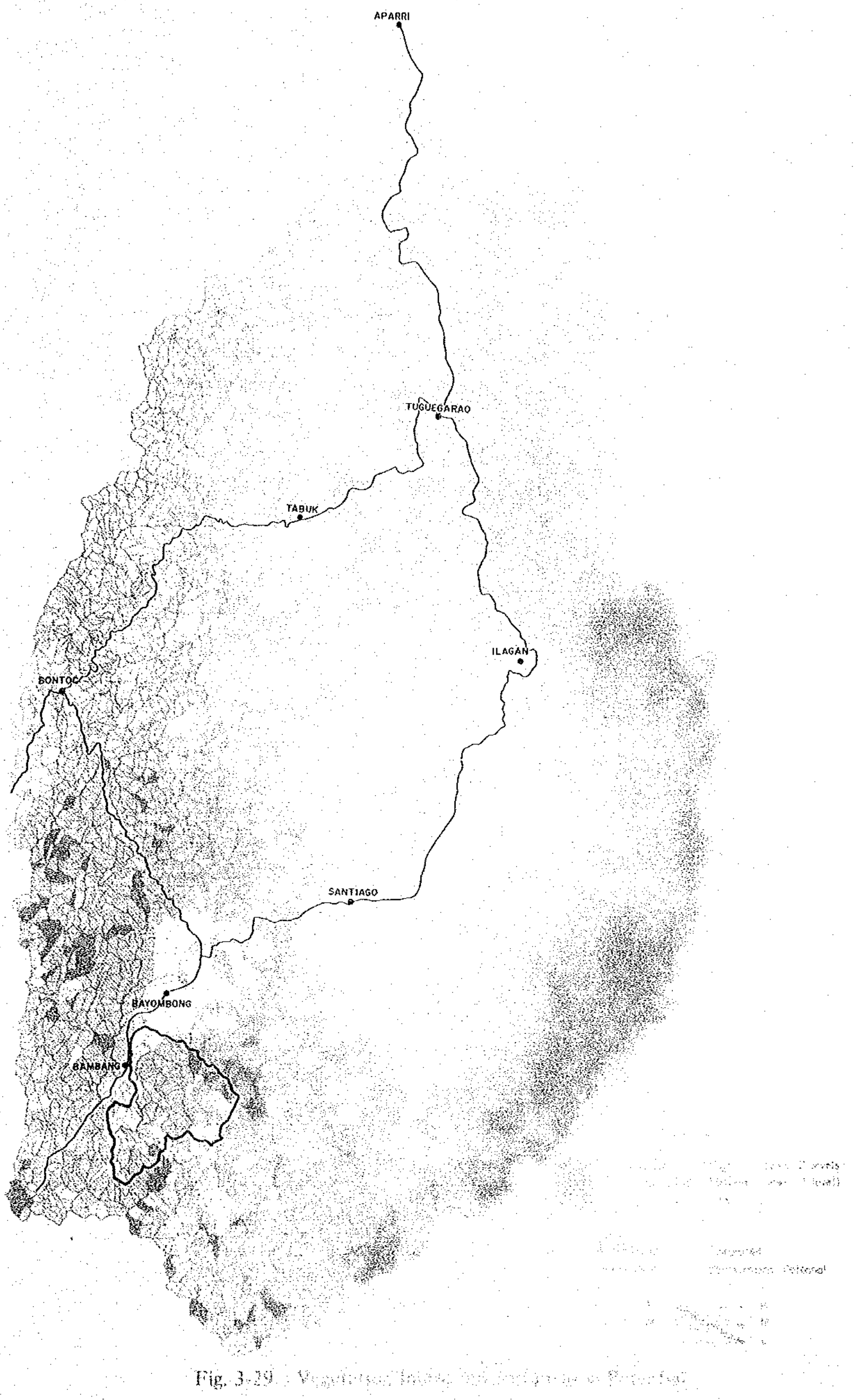

APARRI
TUGUEGARAO
TABUK
ILAGAN
BONTOC
SANTIAGO
BAYOMBONG
BAMBANG

Fig. 3-29 [illegible]

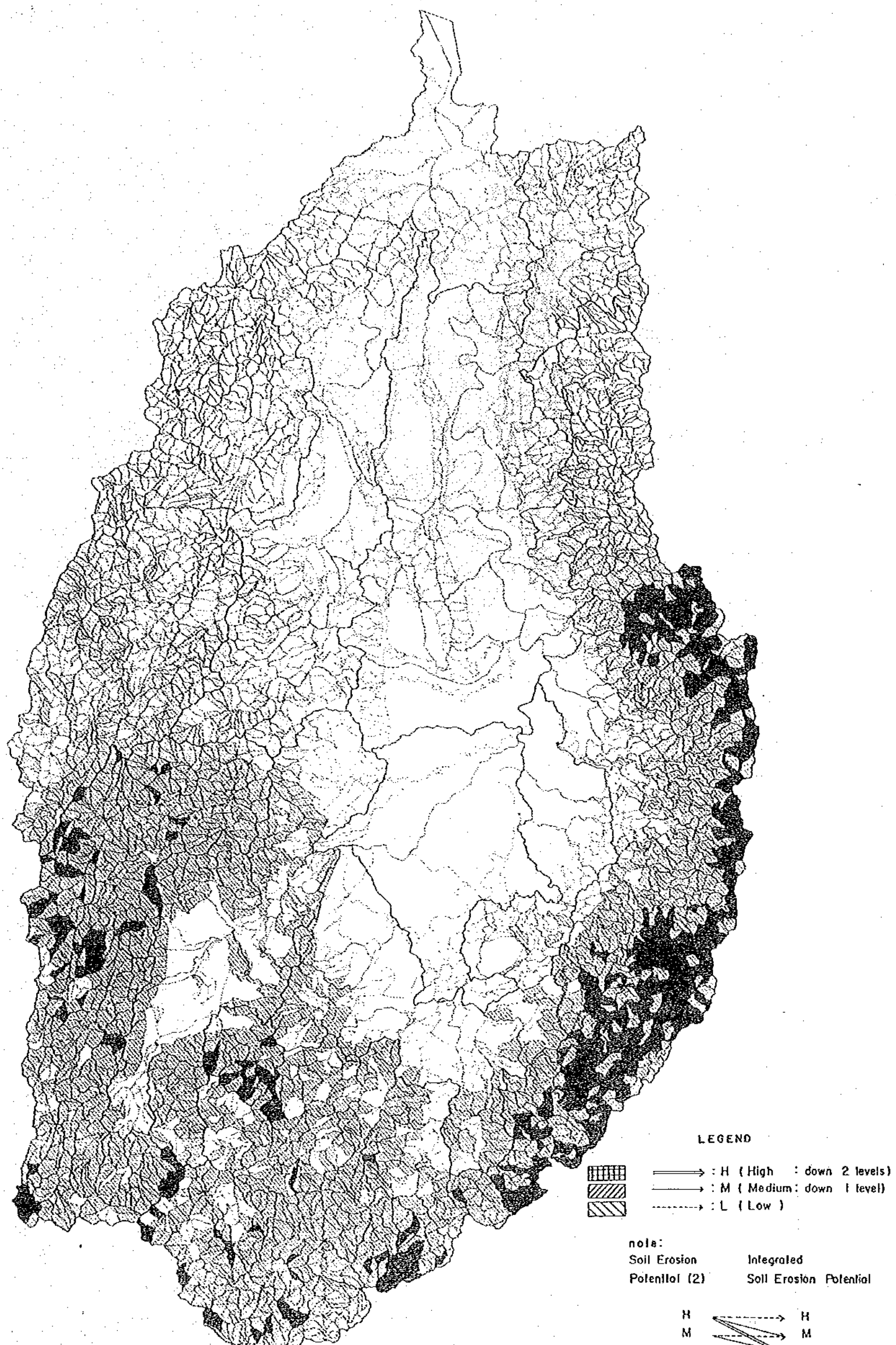


Fig. 3-29. Vegetation Impact on Soil Erosion Potential

(3) Analysis of Hazard of Land Collapse & Slide

In this set of analyses, potential hazards of land collapses and slides due to rainfalls and earthquakes were categorically examined in an attempt to determine the role of existing forests in prevention of these hazards. Their methodology and the analysis results are described below.

1. Hazard of Land Collapse & Slide (1) (Figure 3-30)

In this analysis, land collapse & slide potential was assessed on the basis of slopes, geology (rock types) and presence of faults.

Criteria for the analysis were set based on the correlation analysis of such pairs of variables as geology and incidence of land collapses, slopes and incidence of land collapses, as well as on the field survey findings. (See Annex.)

2. Hazard of Land Collapse & Slide (2) (Figure 3-31)

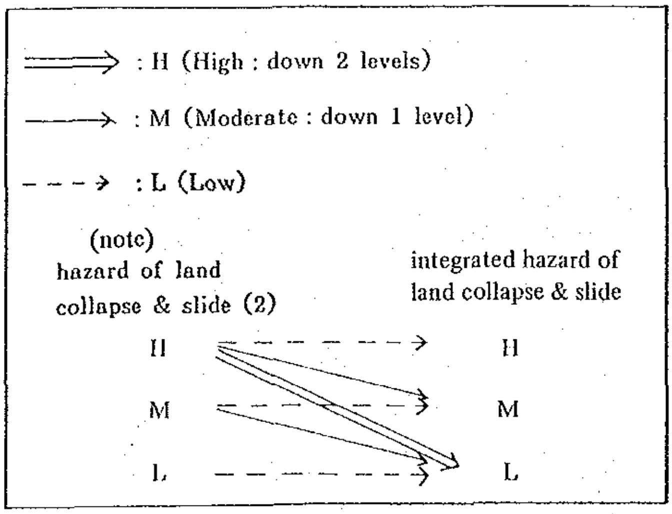
Generally, land collapses and slides are likely to occur where weathering of the base rocks has advanced enough after repeated rainfalls of many rainy seasons, when hit by intensive rainfalls (such as cyclones). Therefore, further to analysis (1), the rainfall distributions were additionally considered as a variable in the Hazard of Land Collapse and Slide (2) analysis.

3. Integrated Hazard of Land Collapse & Slide (Figure 3-32)

In this analysis, the potential of land collapses and slides was evaluated by adding the existing vegetation and land use (forests in particular) to the set of variables applied in the Hazard of Land Collapse & Slide (2).

4. Vegetation Impact on Hazard of Land Collapse and Slide (Figure 3-33)

This analysis evaluates the preventive impacts of existing vegetation and land use (forests in particular) on prevention of potential land collapses and slides in the study area. The evaluations were made by comparing the preceding two analyses, i.e., the Hazard of Land Collapse & Slide (2) and the Integrated Land Collapse & Slide Potential and represented according to the following classifications.



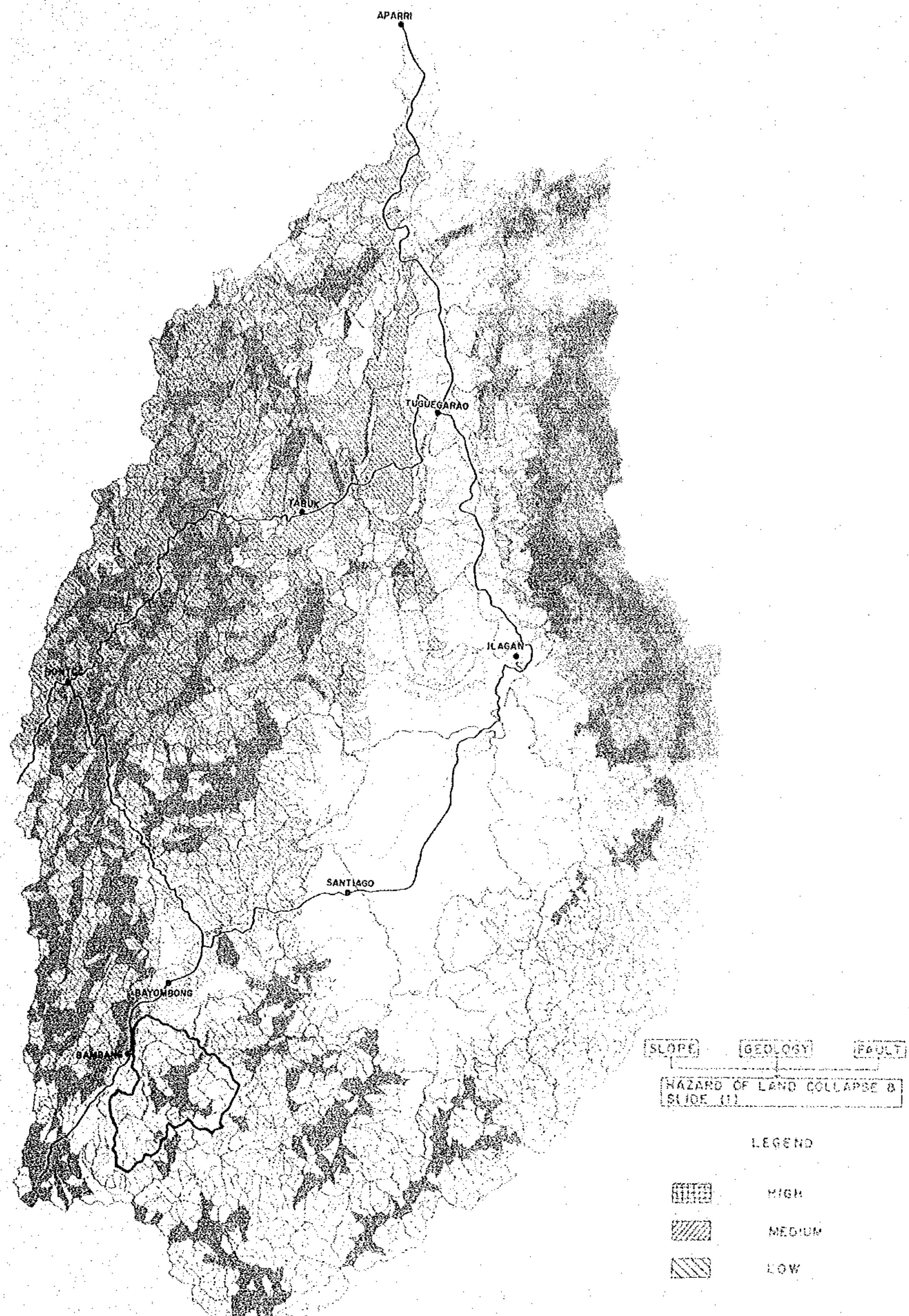


Fig. 3-30. Hazard of Land Collapse & Slide (I)

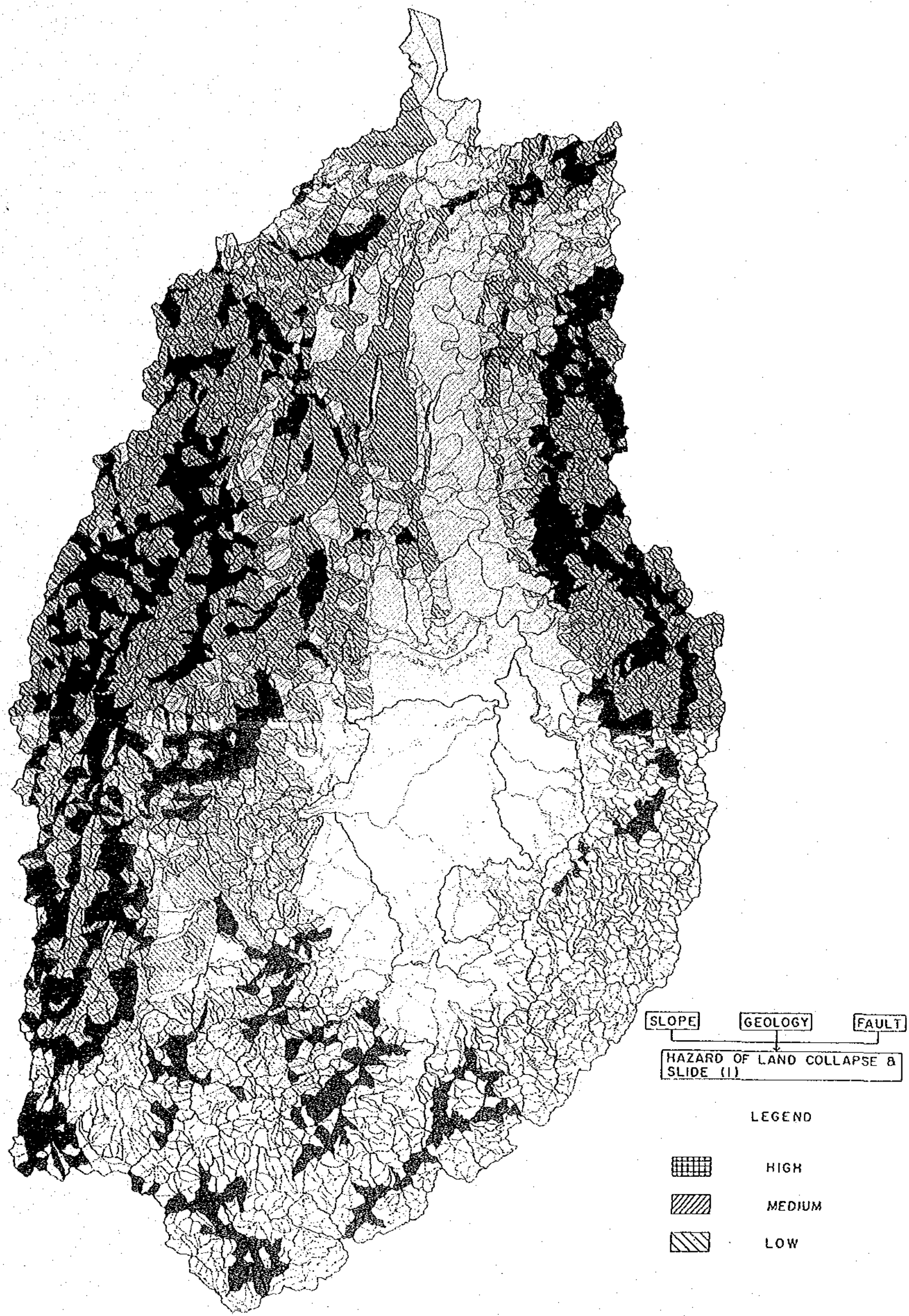


Fig. 3-30. Hazard of Land Collapse & Slide (1)

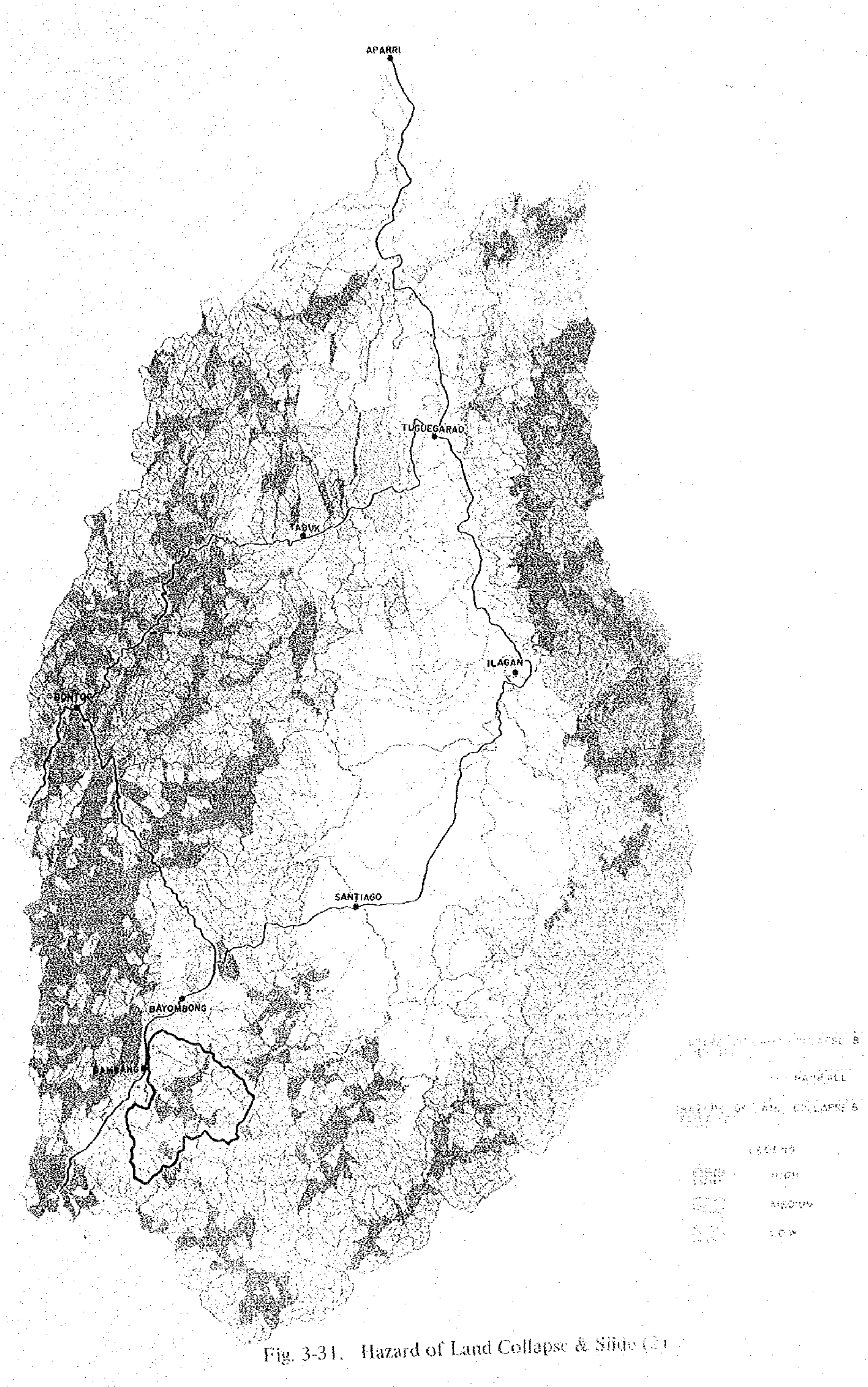


Fig. 3-31. Hazard of Land Collapse & Slide (2)

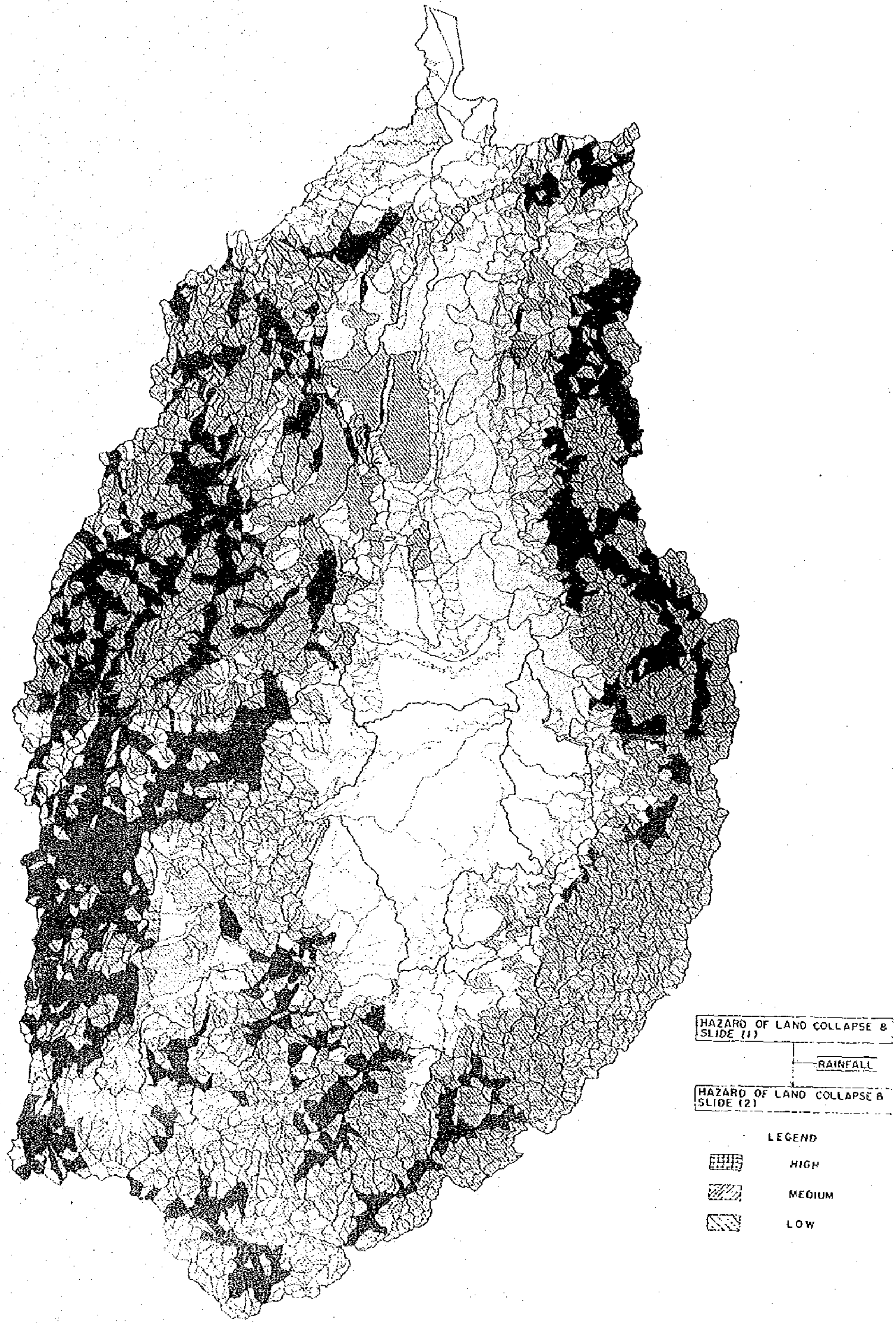


Fig. 3-31. Hazard of Land Collapse & Slide (2)

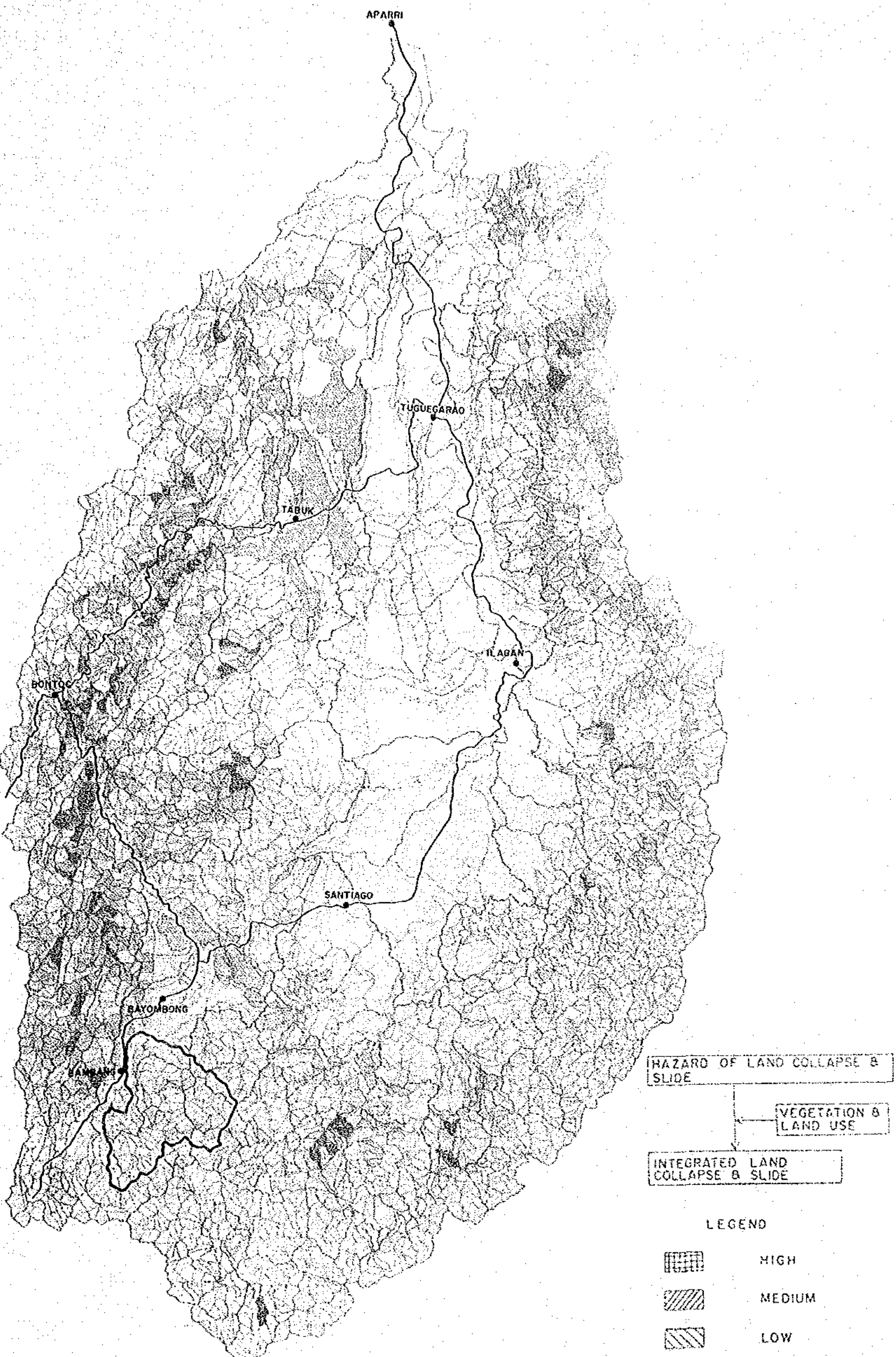


Fig. 3-32. Integrated Hazard of Land Collapse & Slide

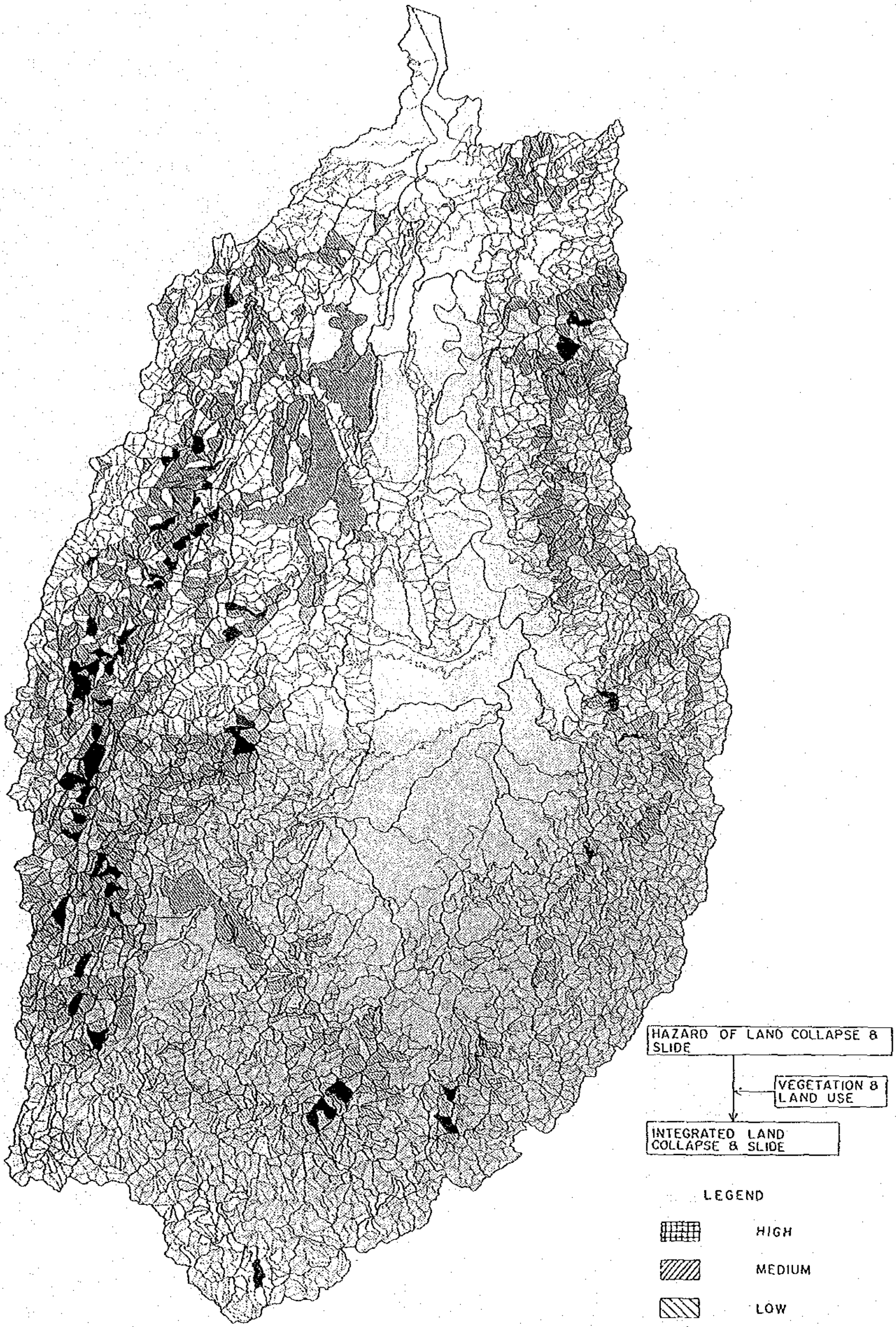


Fig. 3-32. Integrated Hazard of Land Collapse & Slide

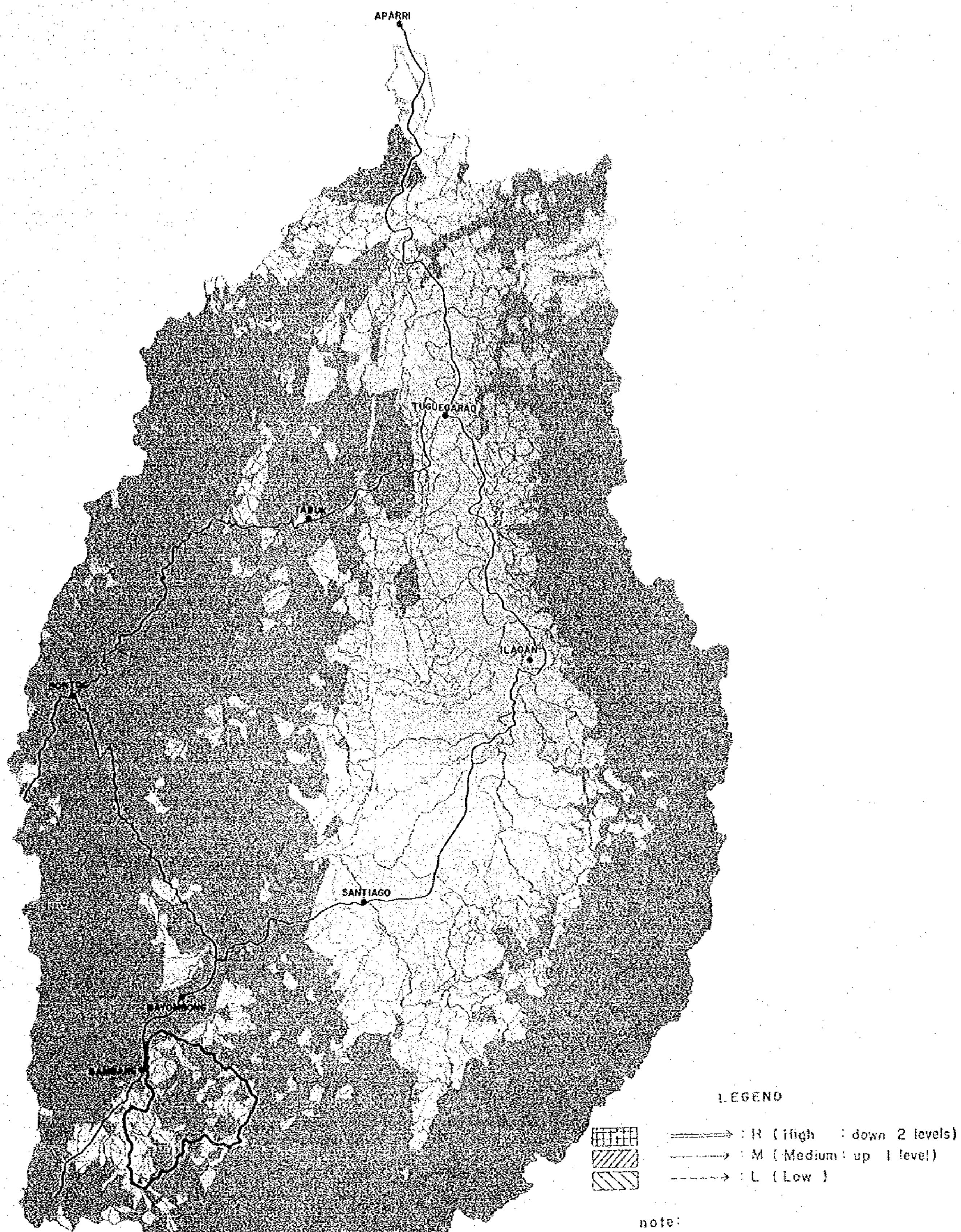


Fig. 3-33. Vegetation Impact on Hazard of Land Collapse & Slide

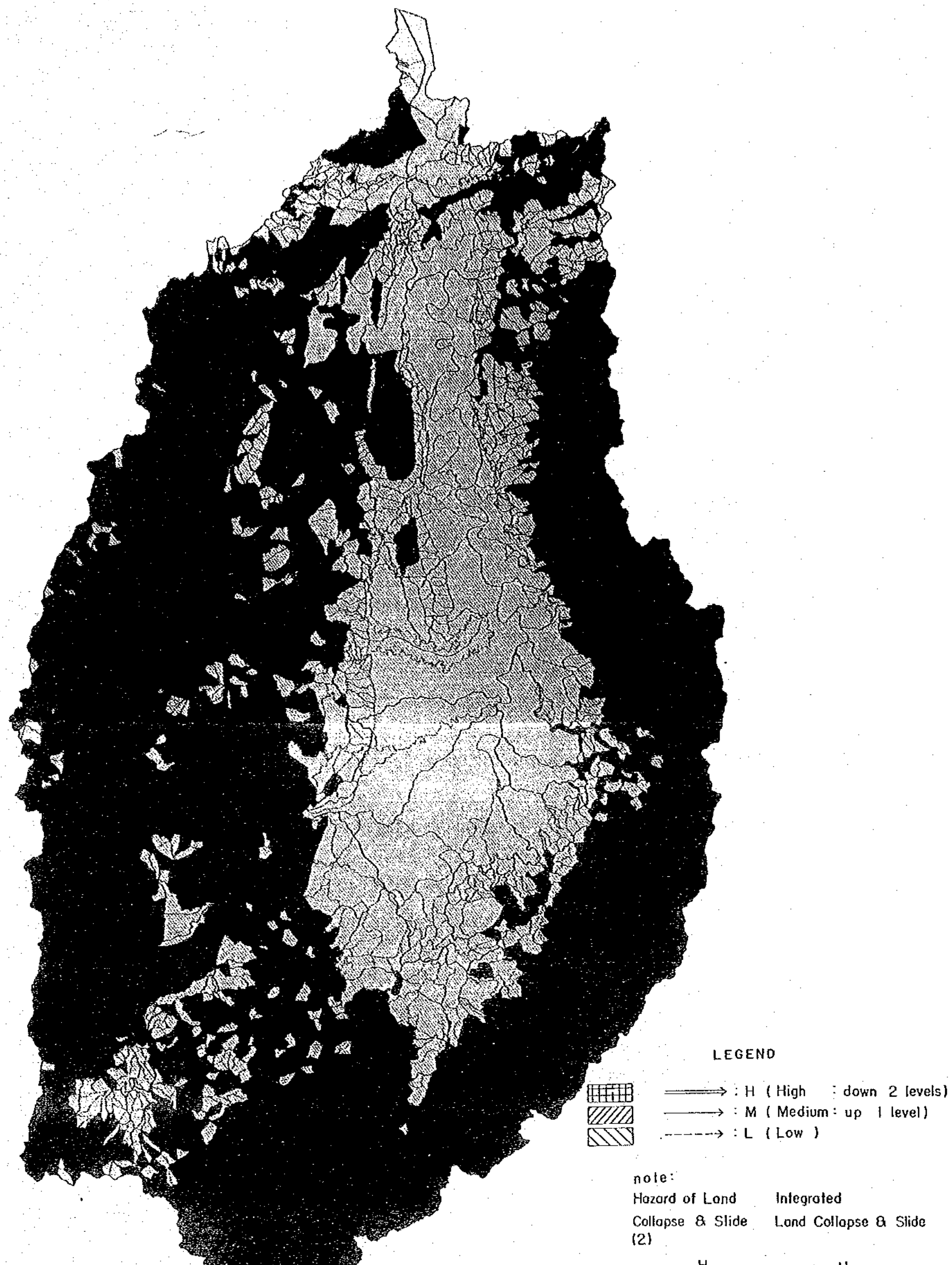


Fig. 3-33. Vegetation Impact on Hazard of Land Collapse & Slide

(4) Water Holding Potential Analysis

Forests are known to retain rain water in temporary pools and delay its outflow, helping to prevent flooding and alleviate shortages of water for agricultural and household use during the dry season.

1. Water Holding Potential Analysis (1) (Figure 3-34)

This is an evaluation of permeability of surface water into the grounnd. Generally, gentle slopes and large-grained loose-knit soils contribute to permeability. Geologically, permeability is high where rocks are as heavily weathered as to turn into sands and gravels or where cracks are developed or porous rocks are distributed. The criteria for evaluation are given in the Annex.

2. Water Holding Potential (2) (Figure 3-35)

Rainfall was considered as an additional variable in the analysis to define the study area in two types, parts of the area which hold water well and those which do not.

3. Integrated Water Holding Potential (Figure 3-36)

The water holding potential as it exists in the study area was examined by adding to the Water Holding Potential (2) the existing vegetation and land use as another variable for consideration in this analysis. If the vegetation and land use is considered in terms of forests, farmland, and bareland, forests serve as a shield and reduce rain water to reach the ground in contrast to farmland and bareland, assuming the rainfall being constant in amount.

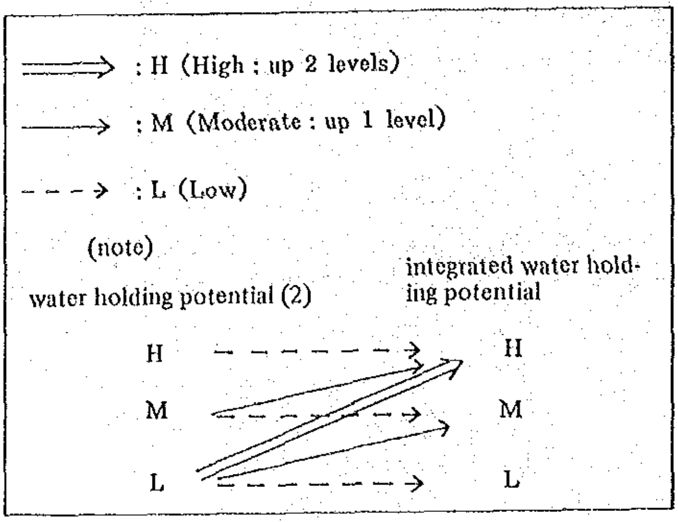
Furthermore, of the rain water that has reached the ground, less is lost in surface run off and more permeates underground in forests than in the other areas. In other words, forests have a greater water holding potential than farmland and bareland and hold rain water during the rainy season and release it later for supplying downstream.

Based on the above considerations, forests were rated most highly in this analysis, followed by farmland and bareland. (See the Weighting Table in the Annex.)

4. Vegetation Impact on Water Holding Potential (Figure 3-37)

This analysis was to determine the water holding potential under the existing conditions including the present vegetation and land use in addition to the basic variables of slopes, soil textures, geology and rainfall as well as to assess the impact of existing forests on water holding potential by comparing the Water Holding Potential (2) and the Integrated Water Holding Potential.

The evaluations were made according to the following classifications.


: H (High : up 2 levels)
: M (Moderate : up 1 level)
: L (Low)
(note)
water holding potential (2)
integrated water holding potential
H
M
L
H
M
L

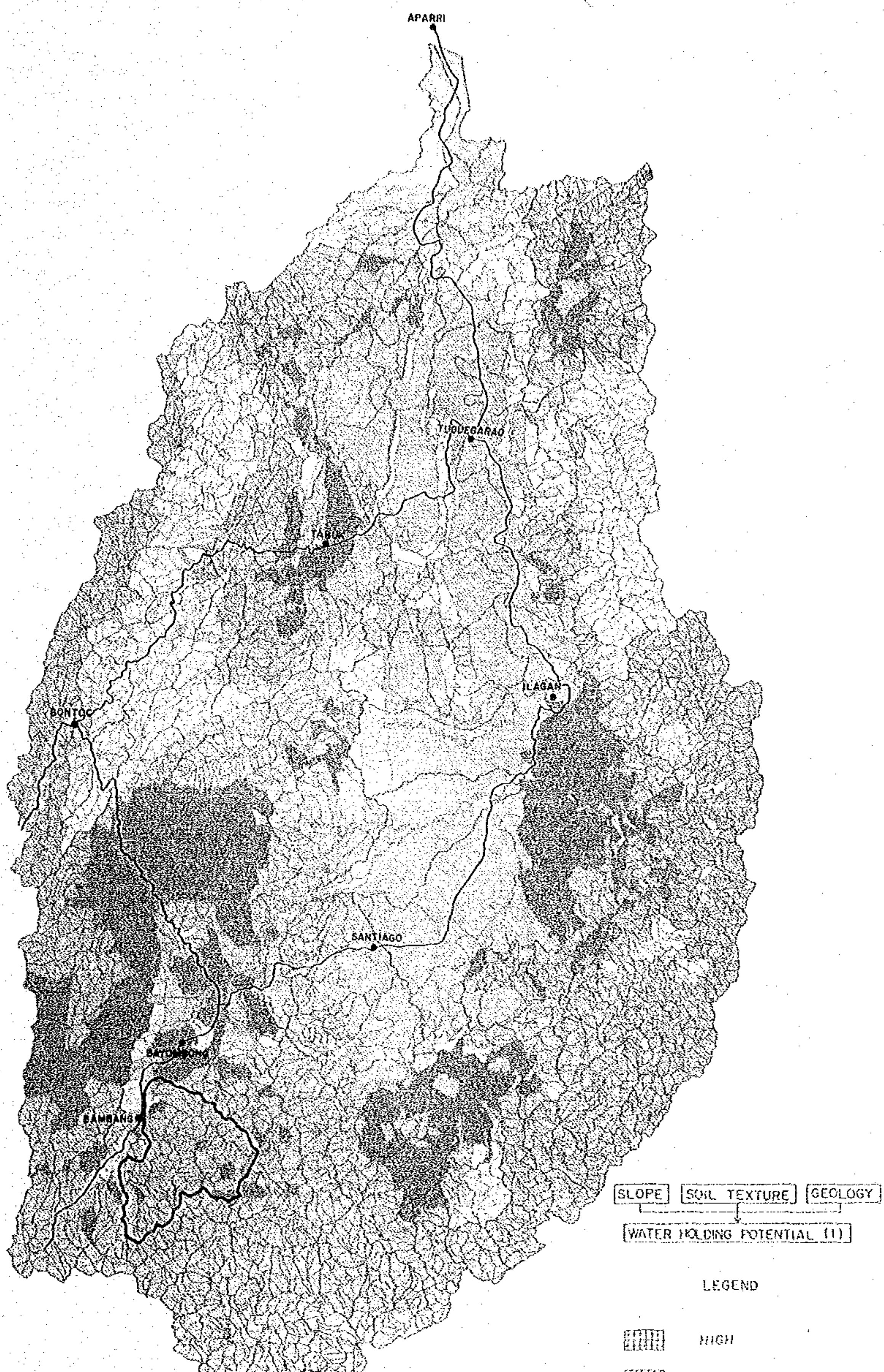


Fig. 3-34. Water Holding Potential (1)

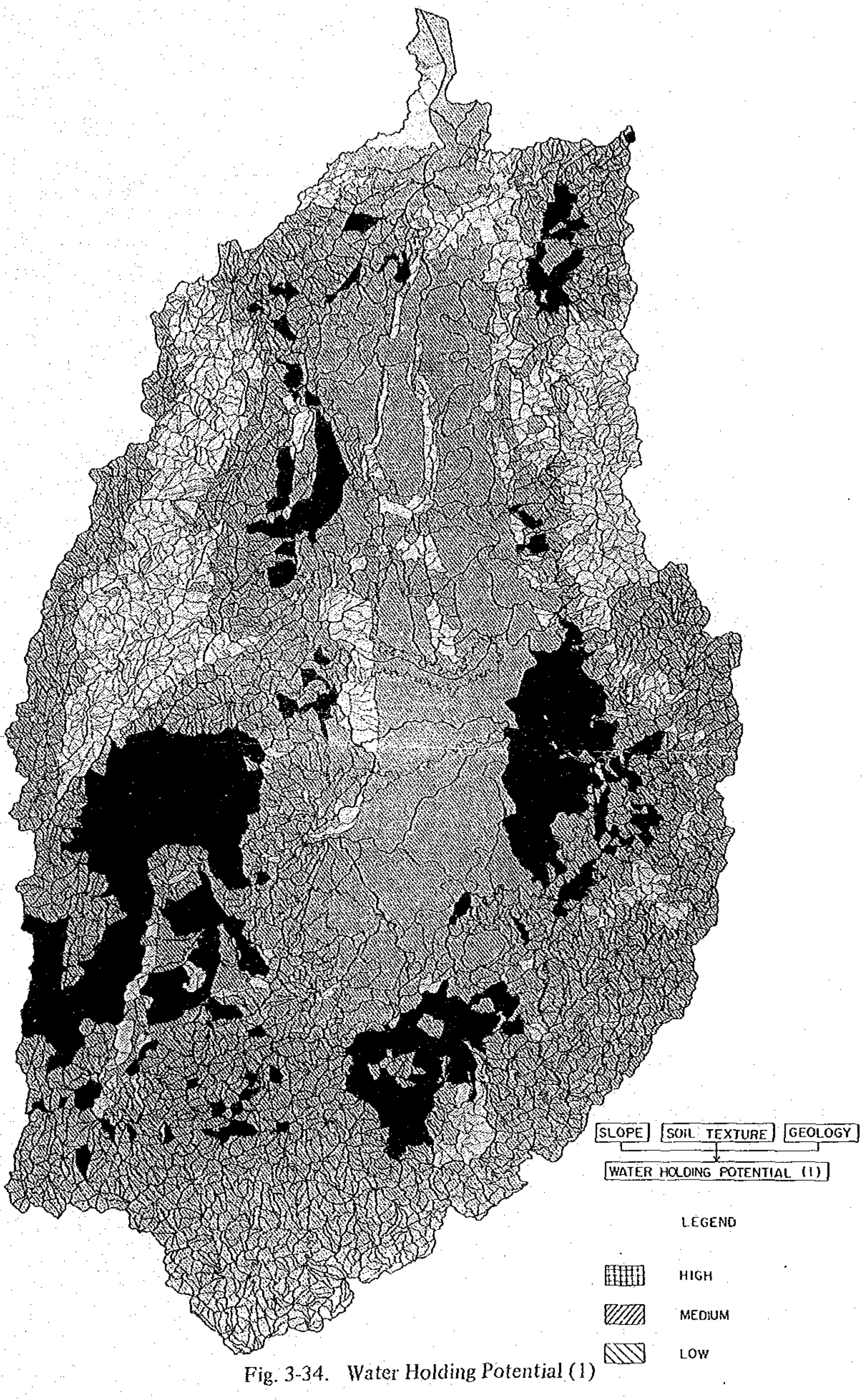


Fig. 3-34. Water Holding Potential (1)

Fig. 3-35. Water Holding Potential (2)

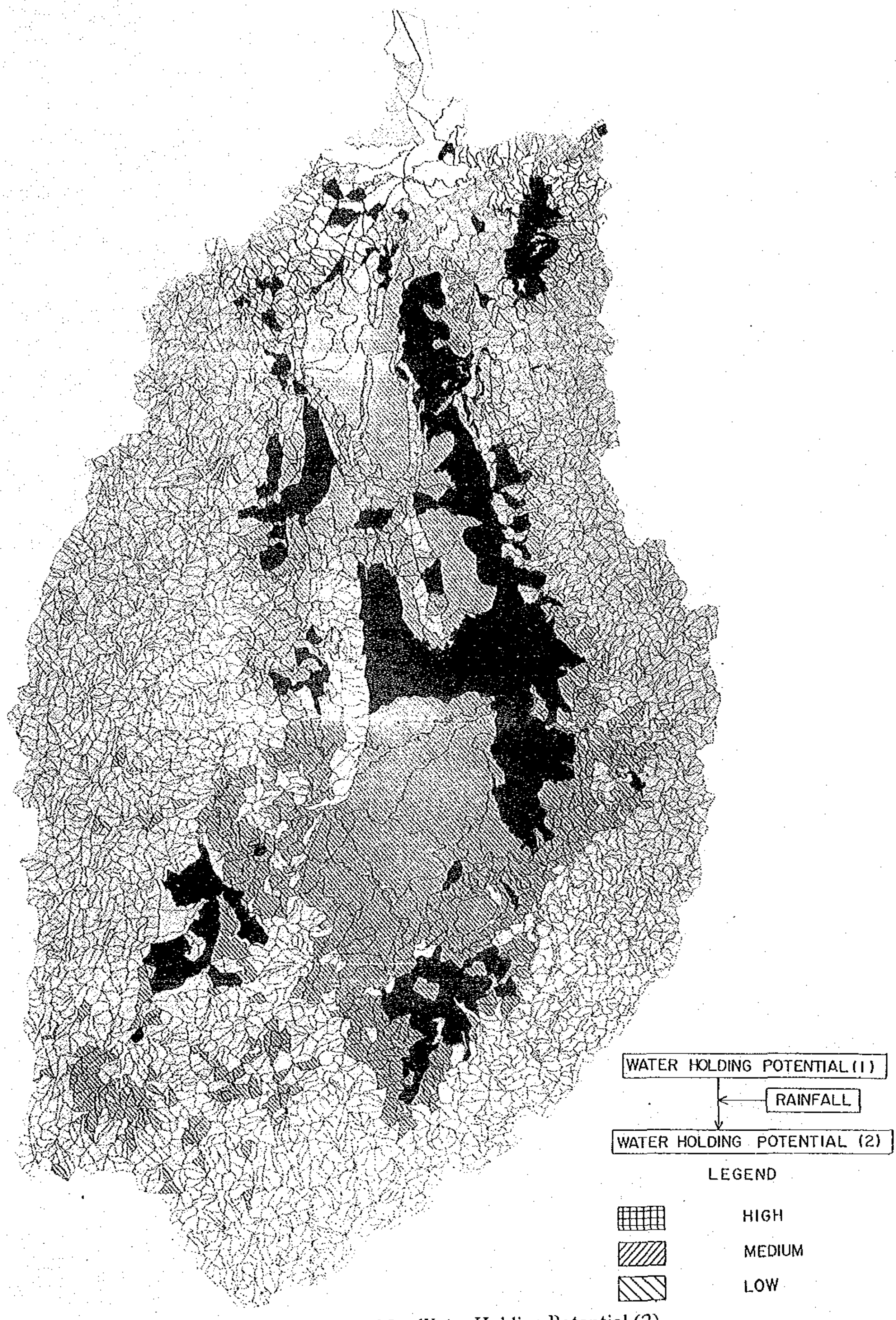


Fig. 3-35. Water Holding Potential (2)

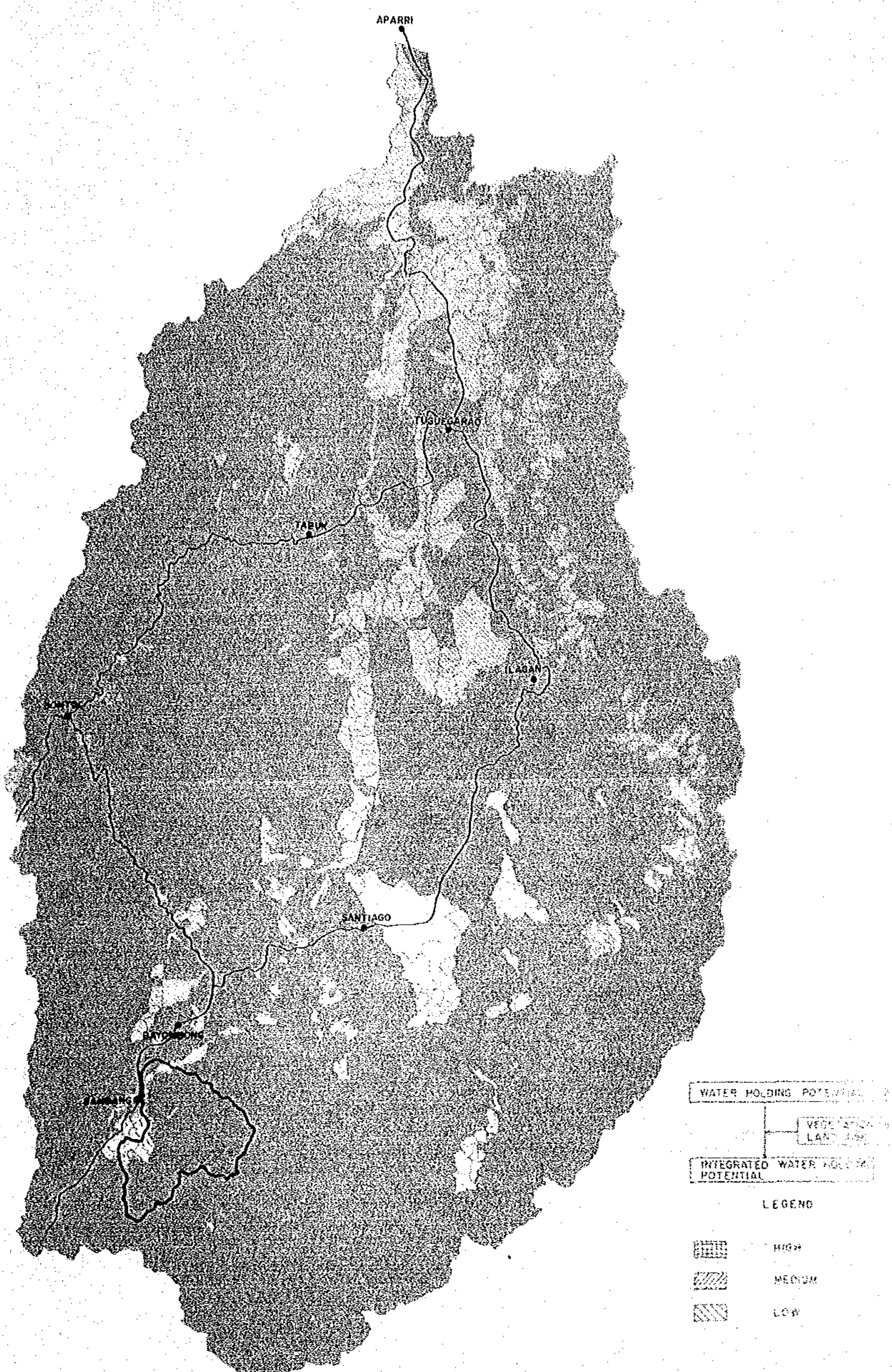


Fig. 3-36. Integrated Water Holding Potential

Fig. 3-36. Integrated Water Holding Potential

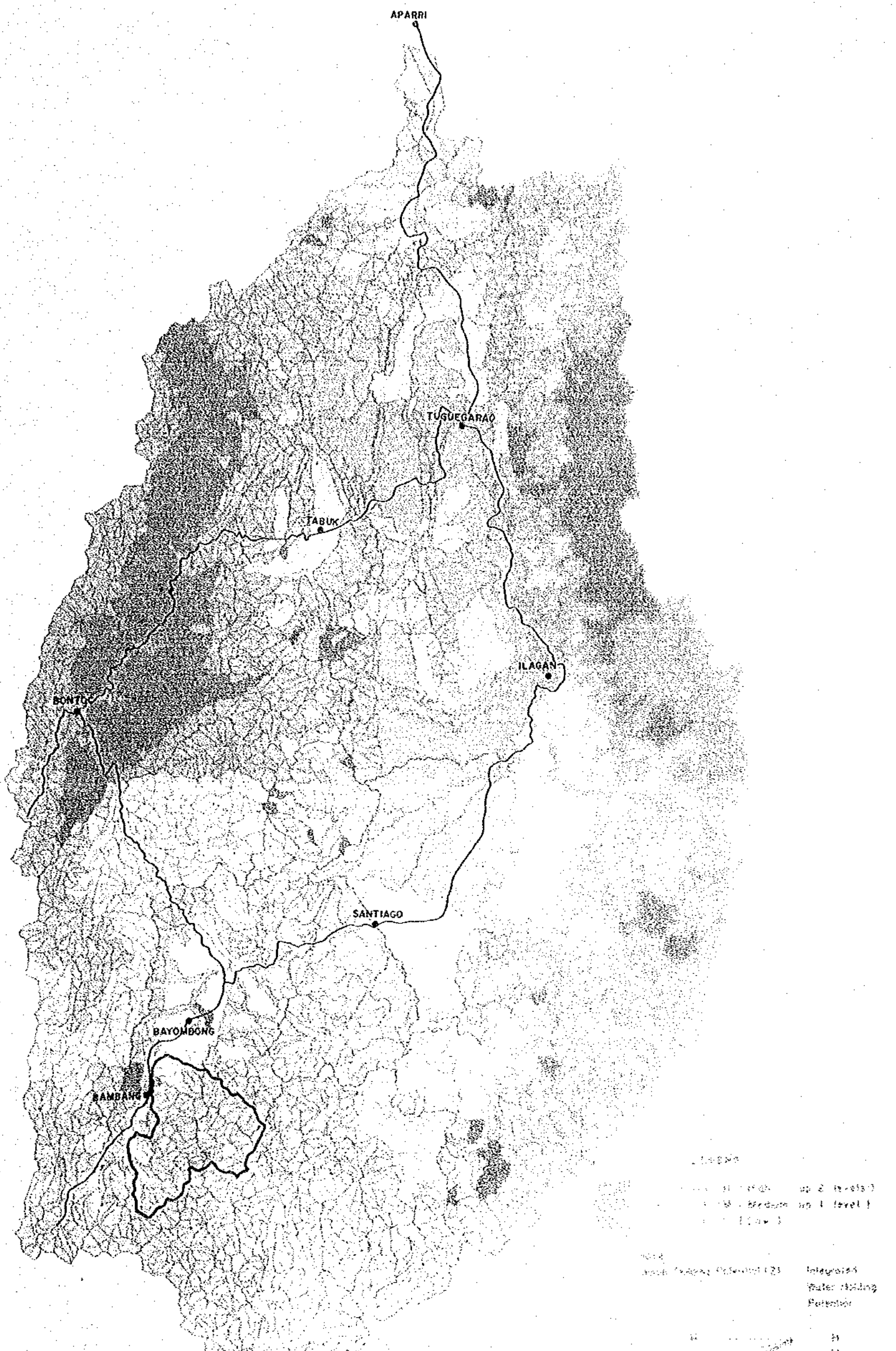


Fig. 3-37. Vegetation Impact on Water Holding Potential

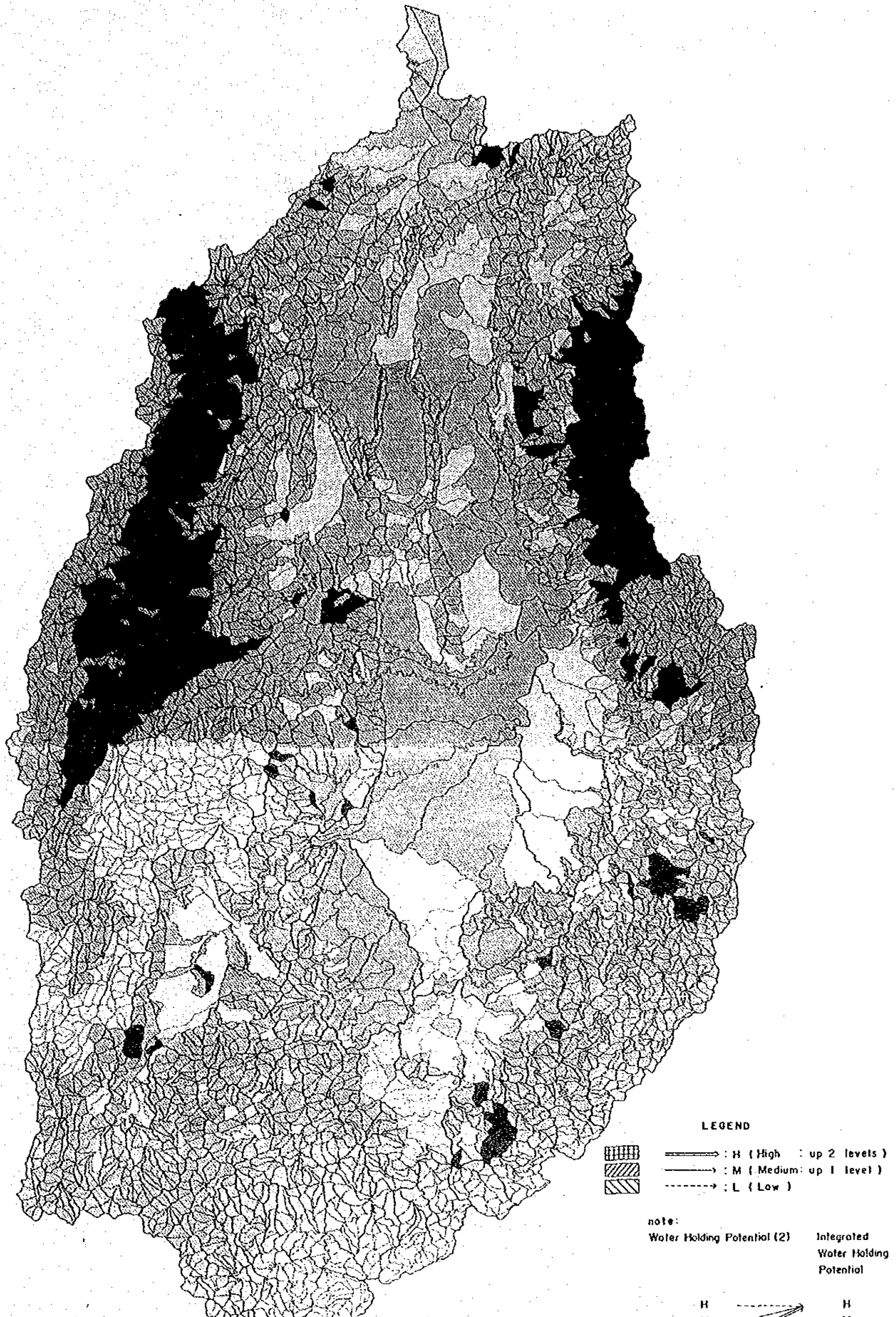


Fig. 3-37. Vegetation Impact on Water Holding Potential

(5) Flooding Potential Analysis

The Flooding Potential attempts to define areas of varying flooding potentials. The areas of highest potential are those originally formed by flooding. Geomorphologically, such areas are:

1. Back marsh (coastal fluvial)
2. Flood plain
3. Valley bottom lowland
4. Fan
5. River bed

These features are limited to areas of under 800m in elevation. The classifications for this analysis were set as follows taking the water catchment areas of major river valleys into consideration.

- Areas of under 800m in elevation, having the above geomorphological features: High hazard potential
- Areas of under 800m in elevation, having none of the above features: Moderate hazard potential
- Areas of over 800m in elevation: Low hazard potential

Figure 3-38 shows the analysis results.

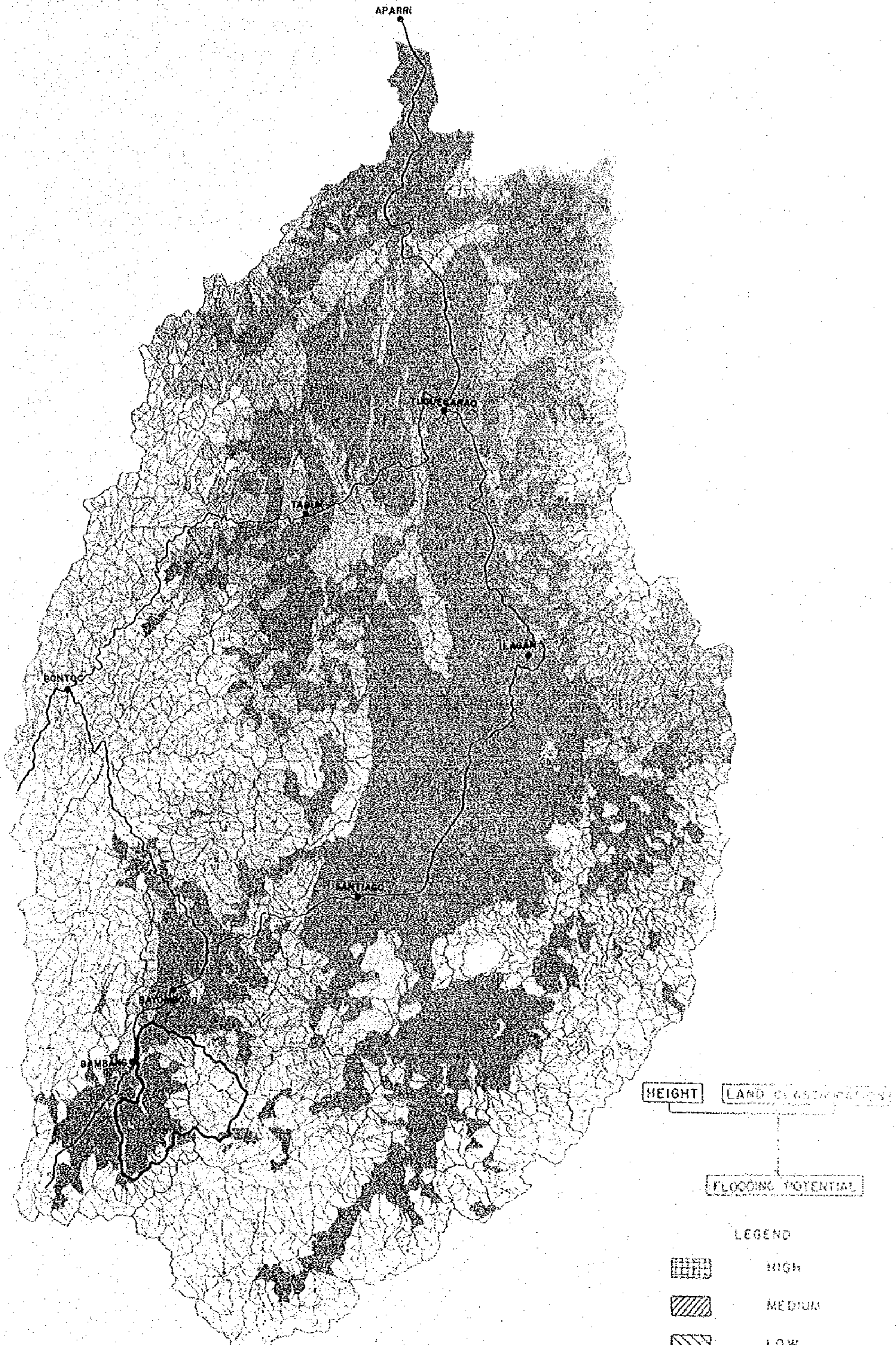


Fig. 3-38. Flooding Potential

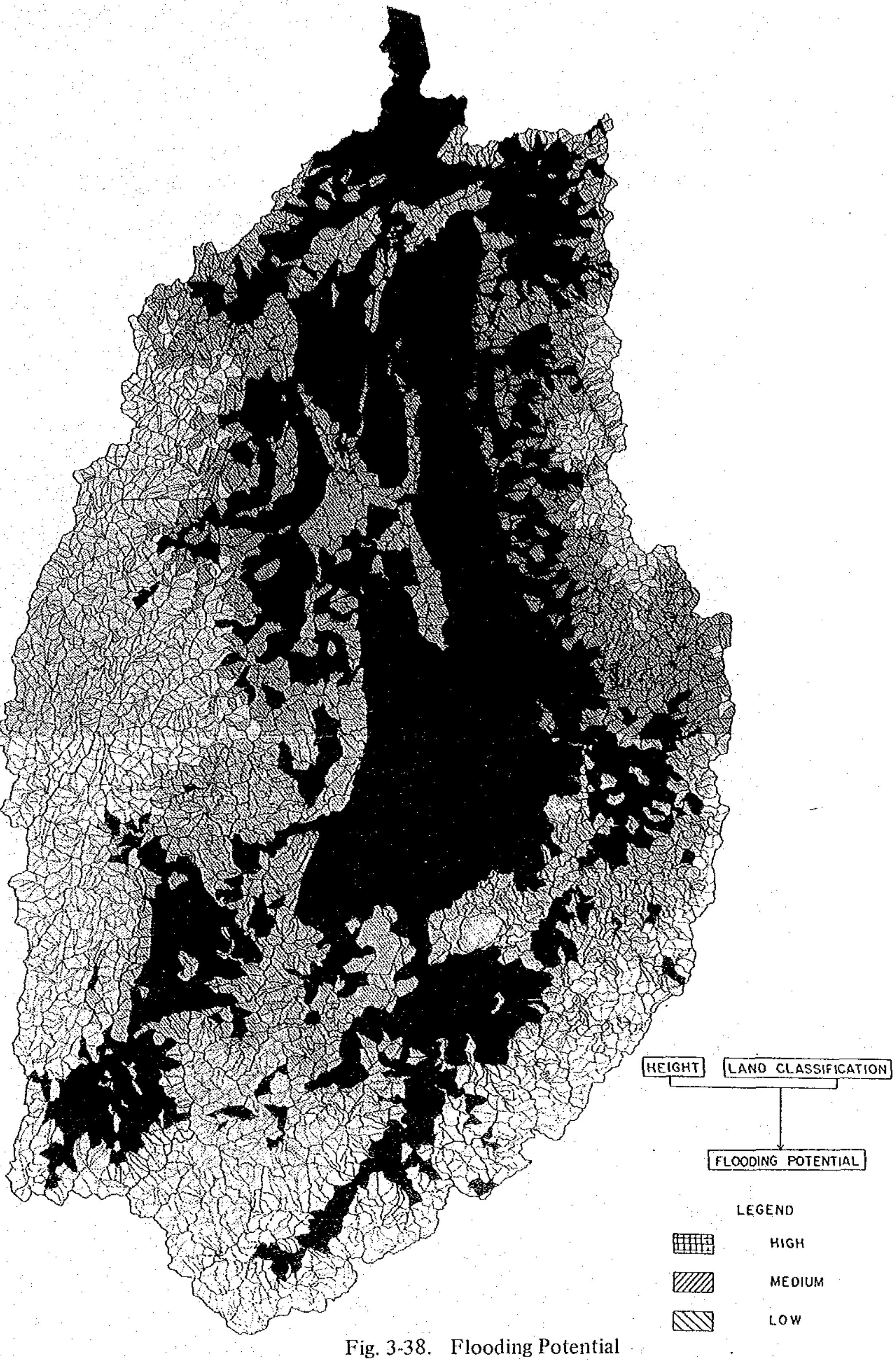


Fig. 3-38. Flooding Potential

(6) Tree Growth Potential Analysis

Of the existing vegetation and land use classifications, Grassland, Logging-in-progress Area, Logged-over Area, and Kaingin Area were evaluated to determine their respective potentials to support the growth of trees. The variables considered were hardness of soils, slopes and soil depths. The soil depths, however, were translated into the following geomorphological classifications as they were applied in the analysis. The analysis involved no specific types of trees but addressed trees in general.

1) Types of terrains with deep soils:
   11. Coastal ridge, sand bar, sand dune
   12. Back march
   14. Flood plain
   22. Colluvial slope, talus
   23. Dissected upland
   24. Hill
   25. Piedmont (rolling)

2) Types of terrains with moderately deep soils:
   13. Natural levee
   15. Valley bottom lowland
   16. Fan
   21. Piedmont (dissected)
   35. Gentle slope on mountain

3) Types of terrains with shallow soils:
   31. Escarpment
   32. Plateau
   33. Low relief surface on mountain
   34. Dissected slope on mountain
   36. Steeply dissected slope

Consistency levels (hardness) of soils can be translated into the following soil classifications.

1. Very soft soils:
   1. Sand (including gravel)
   2. Sand-gravel (including rock)
   4. Silt-loam

2. Moderately soft
   5. Loam
   7. Sandy clay loam
   9. Clay loam

3. Hard soils:
   3. Sandy loam

6. Silt-clay
8. Silt-clay loam
10. Clay
11. Sand

4. Very hard soils:

12. River

Figure 3-39 shows the above analysis results.

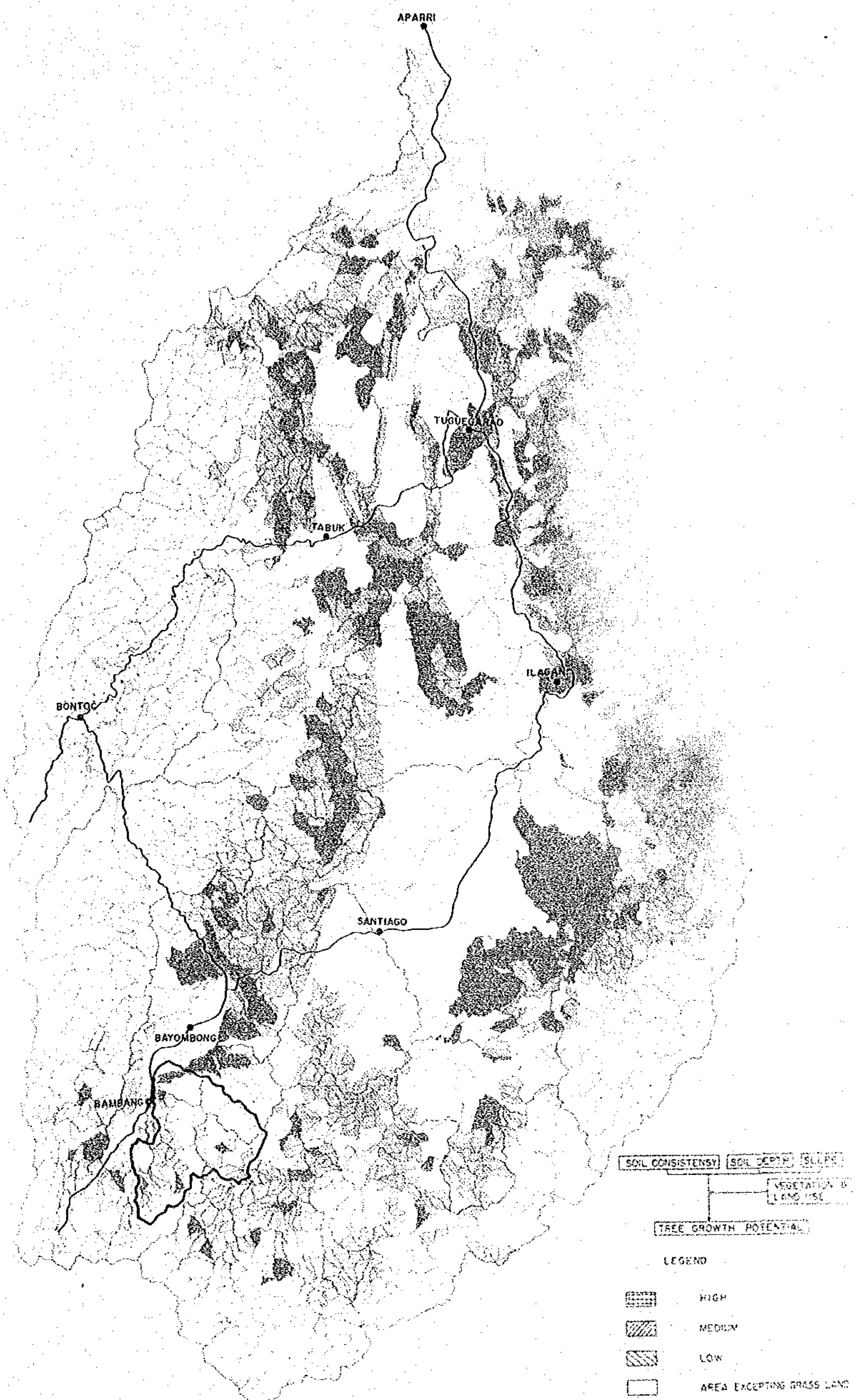


Fig. 3-39. Tree Growth Potential

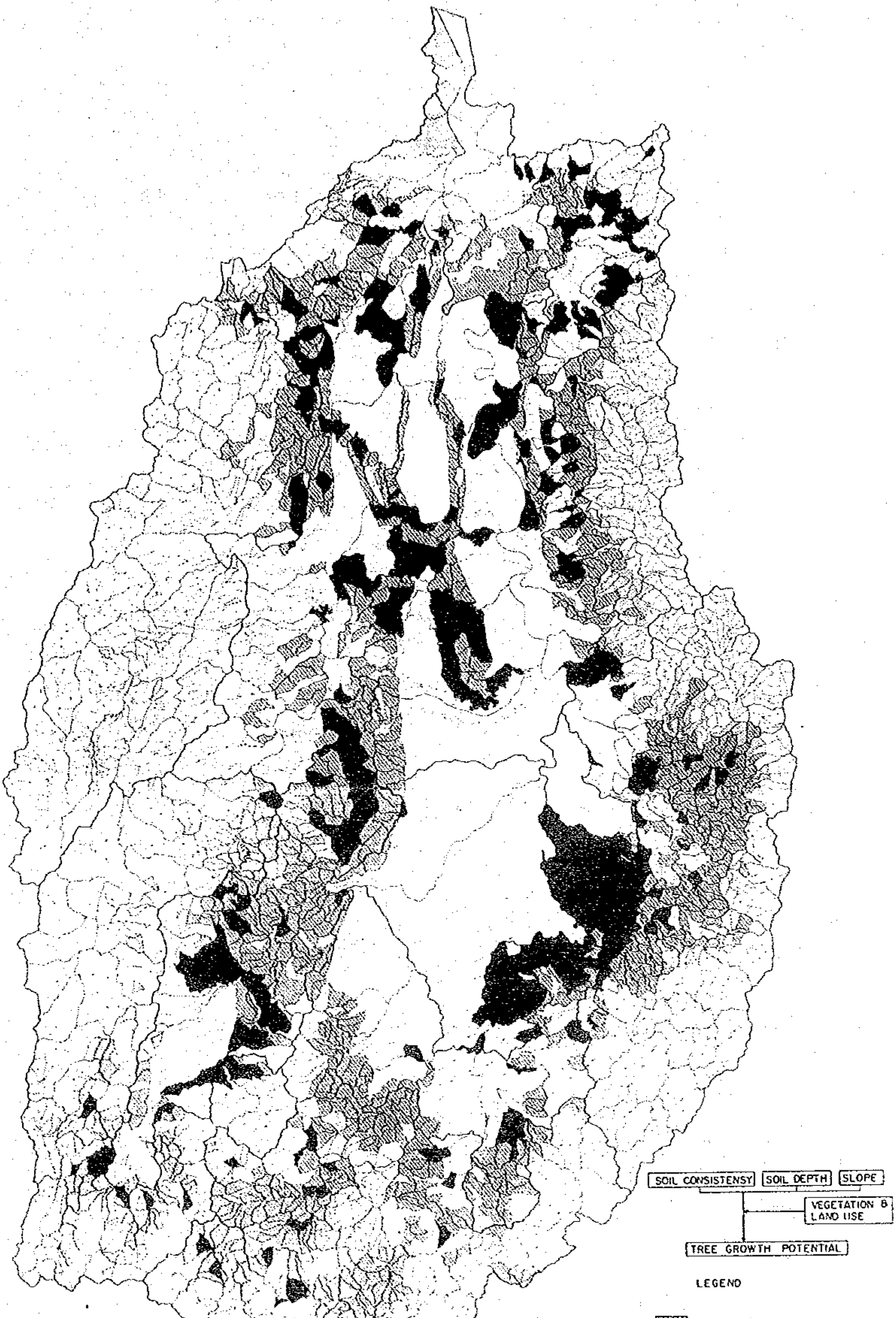


Fig. 3-39. Tree Growth Potential