ANNEX III.3.2.- HANDOUT ON NATURAL GOODS AND SERVICES

NATURAL GOODS AND SERVICES

GOODS/PRODUCTS

1. Potable water (surface and ground)
2. Industrial water (surface and ground)
3. Irrigation water (surface and ground)
4. Lumber and pulpwood
5. Firewood
6. Construction materials from wood (post, beams, etc.)
7. Ornamental plants (indoor, landscaping, dry)
8. Vegetable fibers (rope, cloth)
9. Medicinal plants
10. Food for human consumption (fruits, gum, honey, sap, shoots, seeds, nuts, leaves)
11. Food for human work, animal consumption
12. Food animals for human consumption (fish, fowl, etc.)
13. Aquatic plants for human consumption (algae, sponges)
14. Food condiments (spices, salt, bicarbonate of soda)
15. Plant chemical substances (dyes, stains, waxes, latex, gums, tannins, syrups, drugs, etc.)
16. Fertilizers (minerals, fishmeal, guano, other dung, etc.)
17. Aquatic precious/semiprecious materials (pearl, coral, concha, mother of pearl)
18. Materials for artisan work (rock, wood for carving, fibers for basketmaking, etc.)
19. Metallic minerals (bauxite, ores, nuggets, etc.)
20. Non-metallic minerals (asbestos, clays, limestone, etc.)
21. Construction materials (sands, clay, cinders, cement, gravel, rocks, marble, etc.)
22. Mineral nutrients (phosphorus)
23. Mineral dyes and glazes
24 Hides, leather, skins
25. Other animal materials (bones, feathers, tusks, teeth, claws, butterflies)
26. Other vegetation materials (seeds, pods)
27. Live fish (ornamental, pets)
28. Live animals for pets and zoos
29. Live animals for human work
30. Live animals for research
31. Fossil fuels (crude oil, natural gas, coal)
32 Other fuels (peat, other organic matter, dung, biomass)
33. Livestock forage

ECOSYSTEM OPERATIONS, MAINTENANCE, ADAPTATION, AND EVOLUTION

1. Nutrient cycling
2. Nutrient storage
3. Nutrient distribution (floods, dust and sediment transport, etc.)
4. Photosynthesis-respiration
5. Adaptation
6. Self-regulation
7. Competition testing and design (population control evolution)
8. Mineral cycling
9. Habitat for local land, air, aquatic animals, insects, and other life forms (feeding, breeding, nursery, shelter, etc.)

NON-TANGIBLE GOODS AND SERVICES

1. Windbreak
2. Shade
3. Recreational use of water (swimming, boating, skating, water skiing, sailing, surfing, scuba)
4. Recreational use of land (hiking, spelunking, climbing)
5. Recreational use of air (flying, gliding, parachuting, kiting)
6. Recreational use of animals (sport hunting and fishing, insect collecting)
7. Recreational use of ecosystem (sightseeing, tourism)
8. Scientific tourism (exploring)
9. Value development and storage
10. Spiritual development and storage
11. Historical value
12. Cultural value
13. Early warning system (weather and climate change)
14. Moisture modification (humidity)
15. Temperature modification
16. Light modification
17. Ultraviolet and other radiation filtration
18. Storage of life form adaptive (genetic) information
19. Protection of indigenous cultures and customs

ECONOMIC SERVICES

1. Energy sources (wind, solar, hydro, tides, biomass, geothermal)
2 Dilution of contaminants
3. Decomposition of contaminants (oxidation, evaporation, dissolution)
4. Transport of contaminants (wind, water, animal consumption, air and watershed dilution of contaminants)
5. Erosion control
6. Sediment control
7. Flood control
8. Ground water recharge
9. Space for urban, industrial, agriculture occupations, roadways, canals, airports
10. Waste and contaminant storage
11. Physical support for structures
12. Climate control and protection
13. Disease control and protection
14. Storm buffer

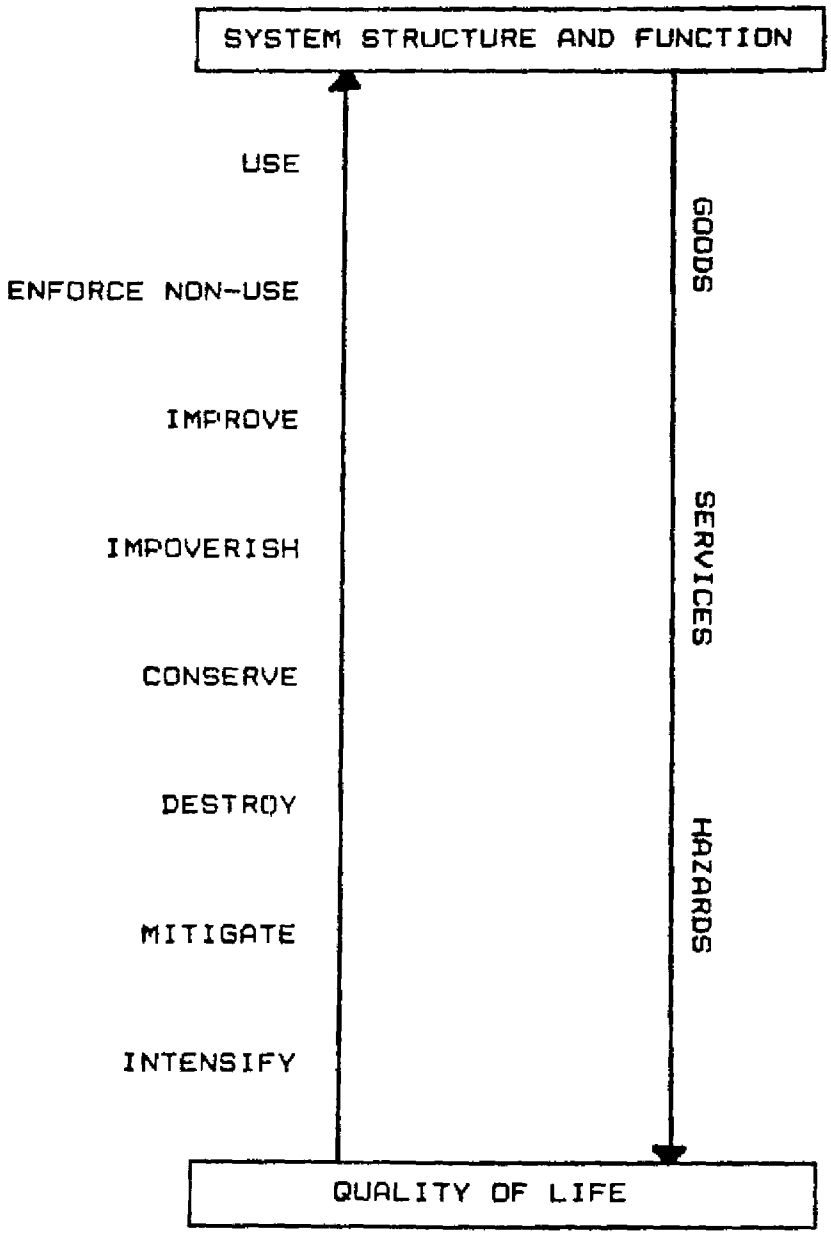
ANNEX III.3.3.- HANDOUT ON NATURAL HAZARDS

ANNEX III.3.3.- HANDOUT ON NATURAL HAZARDS

LIST OF NATURAL HAZARDS

1.- Diseases and plagues (virus, bacteria, flukes, parasites, fungus, etc.)
2.- Natural flooding
3.- Avalanches (land, snow, ice), land slips, mudflows, etc.
4.- Wind (tornados, hurricanes, cyclones, dust storms)
5.- Natural erosion/sedimentation
6.- Temperature extremes (duration, intensity)
7.- Extremes of humidity (duration, intensity)
8.- Drought
9.- Snow
10.- Ice
11.- Hail
12.- Fog, mist
13.- Frost
14.- Solar radiation
15.- Lightning
16.- Fire
17.- Toxic chemicals, gas concentration
18.- Nuclear radiation
19.- Earthquakes
20.- Noxious vegetation (poisonous plants, "invader" species)
21.- Poisonous animals (snakes, insects)
22.- Predators
23.- Volcanoes
24.- Tidal waves

ANNEX III.3.4.- HANDOUT ON ENVIRONMENTAL IMPACTS


SYSTEM STRUCTURE AND FUNCTION
USE
ENFORCE NON-USE
IMPROVE
IMPOVERISH
CONSERVE
DESTROY
MITIGATE
INTENSIFY
GOODS
SERVICES
HAZARDS
QUALITY OF LIFE

ANNEX III.3.5.- UNIT #3 HOMEWORK EXERCISE

ANNEX III.3.5.- UNIT #3 HOMEWORK EXERCISE

ENVIRONMENTAL MANAGEMENT AND NATURAL HAZARDS

Based on the material presented in class prepare a brief essay discussing the attached text. Be sure to note the terminology used in the text and to analyze the meaning of what the text presents in the light of the discussions held in class on the subject.

NOTE TO THE INSTRUCTOR:

The objective of this exercise is to have the participants analyze a standard piece of the literature on environmental management and identify for themselves the erroneous use of terms such as "environment," "environmentally sound ...," "environmental expert," etc.

What follows is an extract of an actual interview of a renowned expert in the subject of environment and development by the editor of an environmental NGO newsletter. Based on the discussions in class, critique both the questions and the responses. "E" is the editor and "I" is the interviewee.

E. "What are the basic fundamentals for considering the environment as an indispensible factor in the formulation of development policies?"

I. "You would have to start from the idea that the process of development transforms nature in unlimited ways. We have defined development as a process of transforming the natural environment to one that is constructed and artificial.

"For us development is not only the specialization of work, but also of nature, that is to say, the use of the environment.

"In economic liturature, it is shown that by specializing work, technology, and capital, productivity is increased; but, another part of the problem is left out, given that in this process, the use of soils, forests, crops, etc. is also specialized.

"In this process of specialization and transformation, ecosystems are altered when raw material, natural resources, energy, etc. are extracted from the natural environment, on the one hand. On the other hand, discharge of the residuals generated by the process of transformation again generates an alteration of the ecosystems.

"Begining with the concept expressed before, we can say that there are economic development problems that could have a better solution if the environmental dimension is taken into account in the process of development."

E. "Can you give us an example where both dimensions were taken into account?"

I. "We can imagine a project for the construction of terraces in eroded areas. This is a project of nature conservation which generates employment and improves soil productivity and, as a consequence, improves life conditions.

"With this focus we retreat from two typical positions: the economic or developmentalist that degrades the environment, and

the conservationist position that devalues development. Neither of the two options is logical nor sustainable. On the other hand, there are sustainable projects that meet economic objectives and which simultaneously preserve, amplify or evade environmental detereoration. In the end, the environment is the fundamental social capital on which we construct everything else."

ANNEX III.10.1.- UNIT #10 CLASSROOM EXERCISE

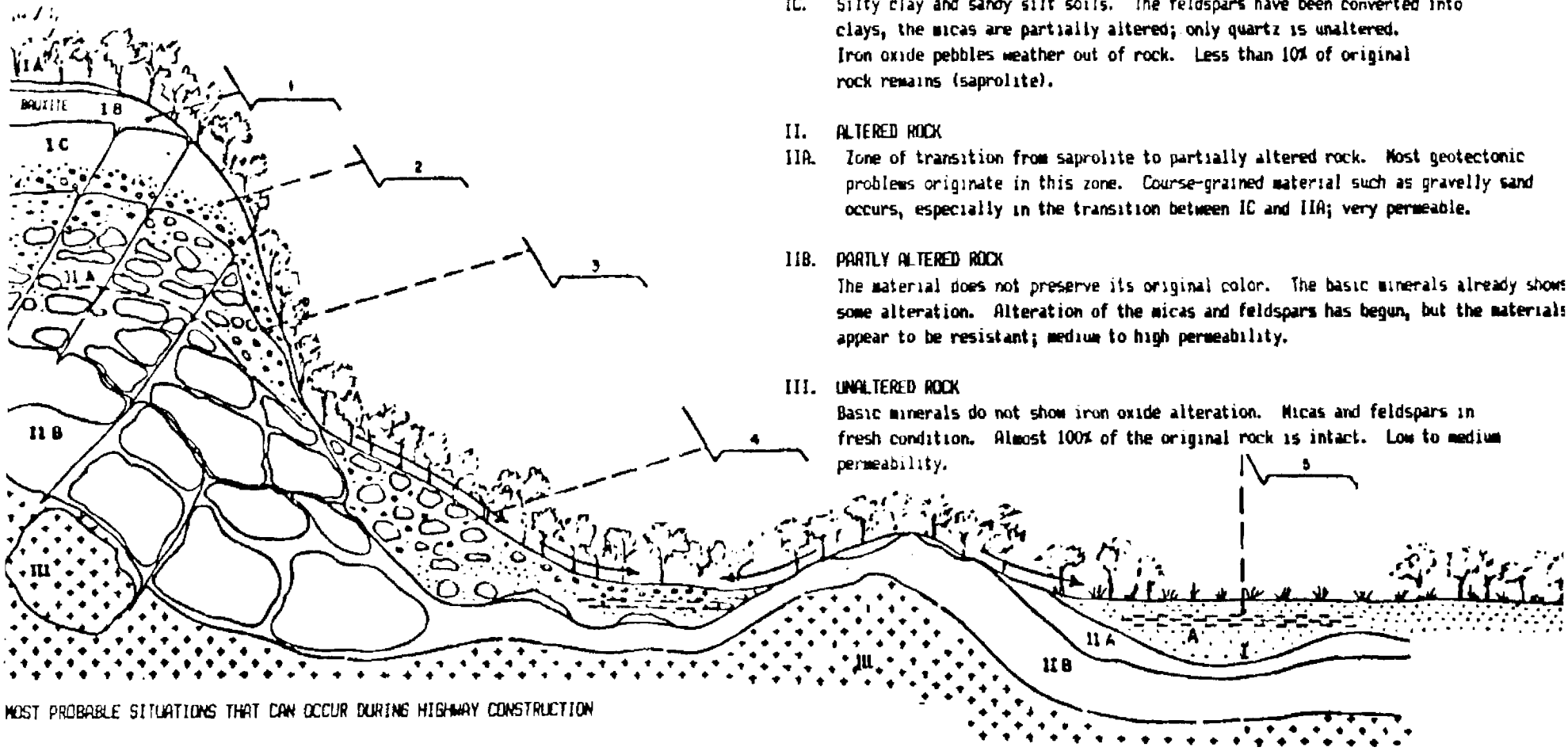
ANNEX III.10.1.- UNIT # 10 CLASSROOM EXERCISE

MASS-MOVEMENT HAZARDS

NOTE TO THE INSTRUCTOR:

Utilizing the exercise samples provided as a guide, develop a classroom exercise in which participants are required to use the different mass-movement hazards concepts presented in class in the analysis of specific projects such as the construction of a highway or a building. Provide both the necessary information and orientation to the exercise so that the participants can integrate technical, economic and social issues in resolving the problems presented.

DIAGRAM OF THE LEACHING PROFILE



I. RESIDUAL SOIL

IA. Organic layer and sandy soil (leaching zone)

IB. Deposition zone, rich in silica, alumina, and iron oxide concretions (bauxite).

IC. Silty clay and sandy silt soils. The feldspars have been converted into clays, the micas are partially altered; only quartz is unaltered. Iron oxide pebbles weather out of rock. Less than 10% of original rock remains (saprolite).

II. ALTERED ROCK

IIA. Zone of transition from saprolite to partially altered rock. Most geotectonic problems originate in this zone. Course-grained material such as gravelly sand occurs, especially in the transition between IC and IIA; very permeable.

IIB. PARTLY ALTERED ROCK

The material does not preserve its original color. The basic minerals already show some alteration. Alteration of the micas and feldspars has begun, but the materials appear to be resistant; medium to high permeability.

III. UNALTERED ROCK

Basic minerals do not show iron oxide alteration. Micas and feldspars in fresh condition. Almost 100% of the original rock is intact. Low to medium permeability.

MOST PROBABLE SITUATIONS THAT CAN OCCUR DURING HIGHWAY CONSTRUCTION

1.- Cutting the lateritic crust - upland sector - (Horizon IB).

2.- Cutting the clayey horizon of residual soil - slope sector - (Horizon IC or Saprolite)

3.- Cutting the gravelly sand horizon of residual soil and altered rock (especially especially Horizons IC - IIA).

4.- Cutting the coluvial material of the slope bottom (characterized by big blocks) and and alluvial sectors (Horizons IIA and C).

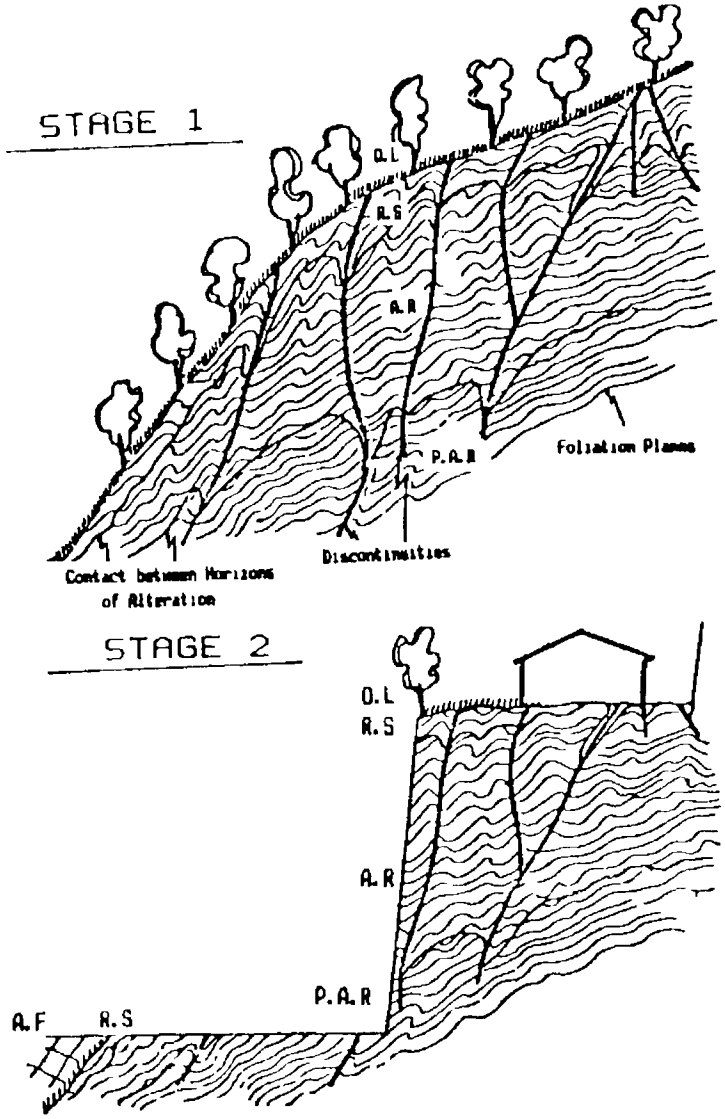
5.- Construction on alluvial and fine coluvial soils (sandy clays) and residual soils (IA and C).

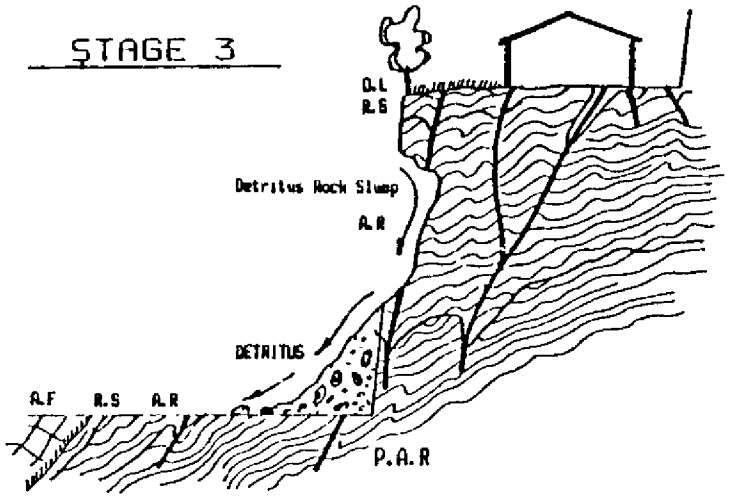
Stage 1: Natural conditions of the slope.

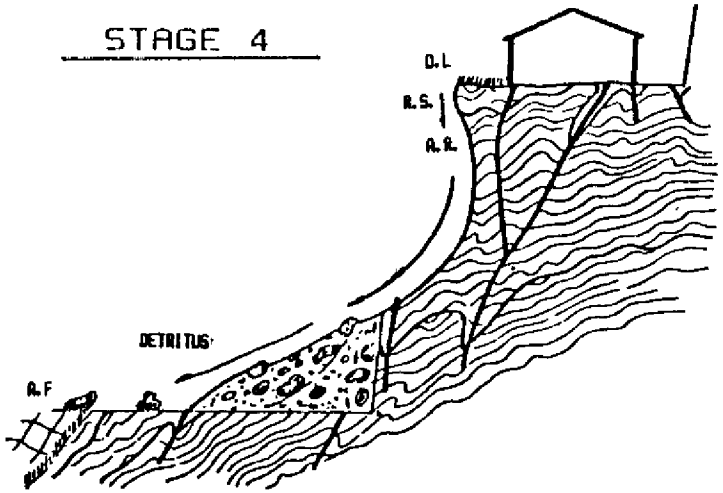
Stage 2: Human intervention: house and garden with an access road.

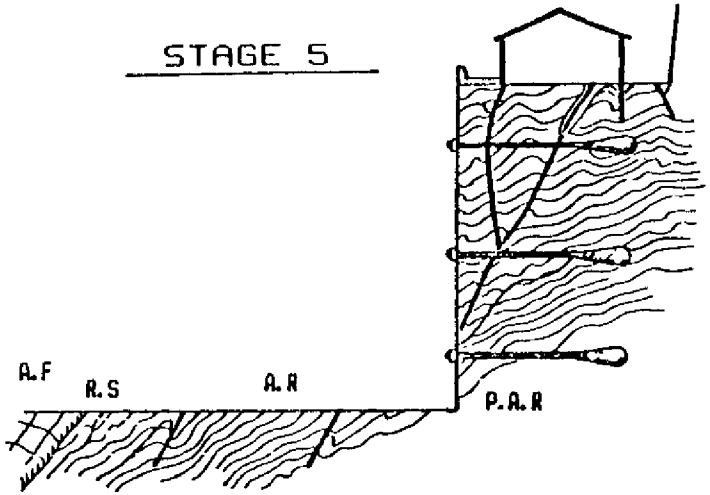
Stage 5: House with railed porch, bulwark with system of anchoring.
The cost of stabilizing the cut is several times greater than the investment to build the house.

Briefly explain the behavior of the land affected by construction between stage 1 and stage 5.









LEGEND

A.F.- Artificial Fill

O.L.- Organic Layer

R.S.- Residual Soil

A.R.- Altered Rock

P.A.R.- Partly Altered Rock

ANNEX III.12.1.- UNIT #12 CLASSROOM EXERCISE

ANNEX III.12.1.- UNIT #12 CLASSROOM EXERCISE

MULTIPLE GEOLOGIC HAZARDS AND LIFELINE NETWORK MAPPING

Based on the material presented in class and on reference maps prepare a draft lifeline network map and the corresponding text explaining the rational of your map. Be sure to include the explanation of any order of pricrity that you might have built-in to your lifeline network map.

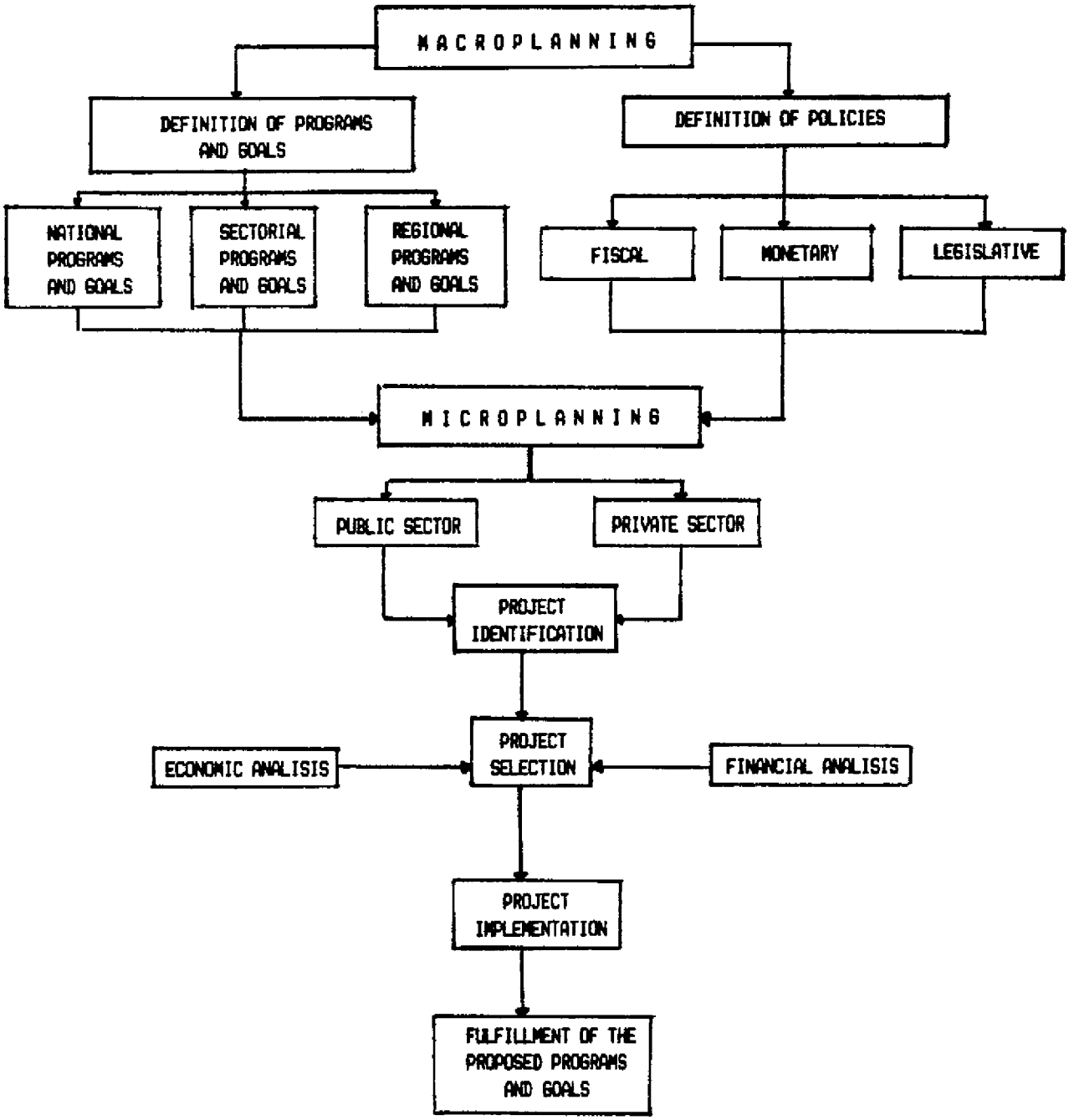
NOTE TO THE INSTRUCTOR:

Attach the following information concerning the city where the course is taking place so that participants can relate this exercise to the observations made during the Technical Field Trip I and their stay in the city:

a.- urban infrastructure map
b.- topography map
c.- natural hazards event maps and information records
d.- available multiple hazards risk and/or vulnerability maps

ANNEX III.15.1.- HANDOUT ON THE ECONOMIC PLANNING PROCESS

SIMPLIFIED DIAGRAM OF THE PLANNING PROCESS



ANNEX III.15.2.- HANDOUT ON NATURAL HAZARDS TRADE-OFF ANALYSIS

NATURAL DISASTERS IN AN ECONOMIC AND HUMAN INTERESTS CONTEXT